

EXPORT NUMBER

EDITORIAL INDEX—PAGE 474
ADVERTISING INDEX—PAGE 170.
BUYERS' DIRECTORY—PAGE 151.

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
Published by the MacLean Publishing Company, Limited, Toronto, Canada

Vol. XXII. No. 19

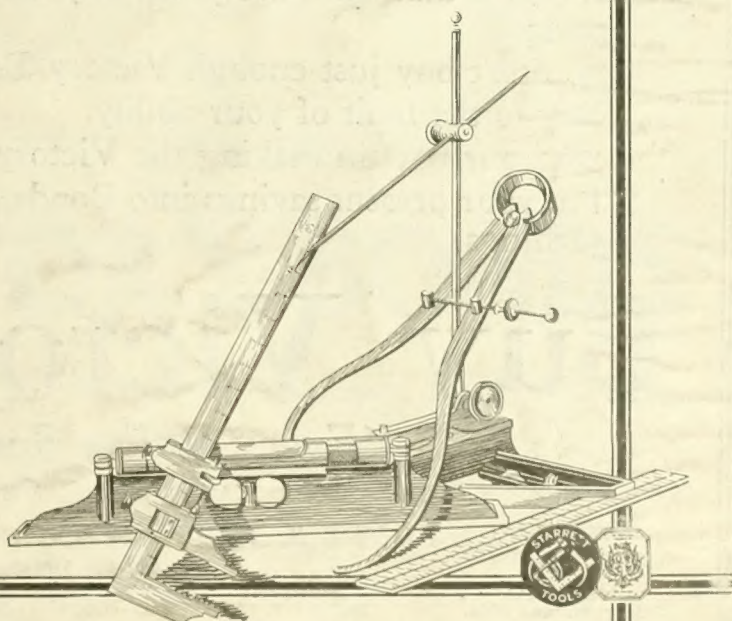
Publication Office: Toronto, November 6, 1919

Subscription Price
\$3.00 per year



For thirty-nine years
machinists have had
a preference for

Starrett Tools



BOOST THE VICTORY LOAN!

Get on a Train and See Your Security

If you were to board a train at Halifax or Vancouver and ride for 3,500 miles across this broad country—you would see something of the security behind the Victory Bonds. You would ride for a week—but even then you would only see a narrow strip of Canada's hundreds of millions of acres—a country nearly twice as large as all Europe. You would see

the farms and forests
the prairie and plains
the mines and the mills
the docks and the elevators
the steamers and the railroads
the cities
the towns

All this is the security behind your Victory Bonds.

This is the security that makes Victory Bonds one of the world's premier investments. Victory Bonds are the safest securities. Victory Bonds pay a good rate of interest—nearly twice as much as Savings Banks. And you know how vital it is to Canadian Prosperity—and your own welfare—that the Victory Loan shall be successful.

It means that Canada's prosperity and your own prosperity will continue.

So don't buy just enough Victory Bonds to "square your conscience." Buy to the limit of your ability.

Do your part in making the Victory Loan a huge success.

Put your present savings into Bonds and borrow against your future earnings.

Buy Victory Bonds

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN 1919 CAMPAIGN BY
PRATT & WHITNEY CO., OF CANADA, LIMITED

Works: Dundas, Ontario

MONTREAL
723 Drummond Bldg.

TORONTO
1002 C.P.R. Bldg.

WINNIPEG
1205 McArthur Bldg.

VANCOUVER
B.C. Equipment Co.

HALIFAX
Davidson Building

Do It Again

The reaction from war to peace has been sudden and strong. Our courage may be a bit spent, our enthusiasm for service a trifle on the wane.

It needs a little effort and some determination to rekindle the old fire, but it must be kindled if the Victory Loan is to be a success.

Canada calls upon you, therefore, for a renewal of your faith and a renewal of your effort.

And that can best be expressed if you do your utmost to inspire people to

BUY VICTORY BONDS

P.S.—There is an old saying to the effect that “if you can’t sing the words you can whistle the tune.”

If you haven’t any ready money, borrow some and

BUY VICTORY BONDS

THIS SPACE IS DONATED TO THE 1919 VICTORY LOAN CAMPAIGN BY

The John Bertram & Sons Co., Limited
DUNDAS, ONTARIO, CANADA

MONTREAL
723 Drummond Bldg.

TORONTO
1802 C.P.R. Bldg.

VANCOUVER
609 Bank of Ottawa Bldg.

WINNIPEG
1205 McArthur Bldg.

HALIFAX, Davidson Bldg.

Canada Fights to Win

When Canada fought—Canada fought to win.

We are now in the midst of another campaign.

The Victory Loan is a campaign to raise money to pay the obligations that the war has left us, and to keep Canada prosperous.

The Victory Loan 1919 calls for vigorous individual and concerted action.

It is a national platform on which all citizens concerned in their country's prosperity and welfare can, without reservation, take a strong, emphatic stand.

The Victory Loan 1919 is the "clean up" chapter in Canada's War History—it is needed to round out the most glorious of our achievements.

It is needed to "carry on" the National Business—to successfully bridge the period from War to Peace—and to speed our country along the highway of international commerce in successful competition with other great nations.

Your personal co-operation is imperative.

Your support is vital.

It is unthinkable that Canadians—united for years when things looked dark—would not, in the same spirit of patriotism, unite in this last great war effort.

Let us show the world again that what Canada undertakes Canada accomplishes.

Buy Victory Bonds

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN 1919 CAMPAIGN BY

"CANADIAN MACHINERY & MANUFACTURING NEWS"

TORONTO, ONTARIO

By Product Coke

Hamilton Pig Iron

Open Hearth
Steel Billets

Steel and
Iron Bars

Open Hearth
Steel Sheets

Drop
Forgings

Quality

**THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON MONTREAL**

Service

Railway
Fastenings

Wrought
Pipe

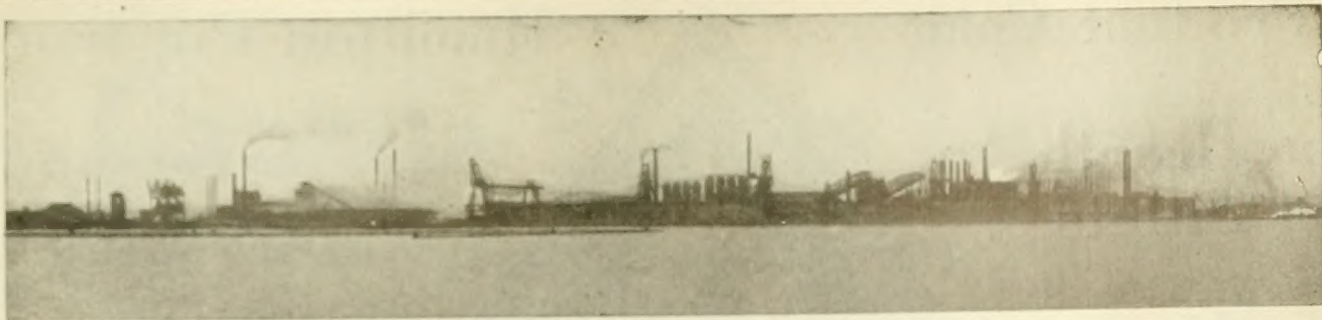
Pole Line
Hardware

Screws & Nails

Bolts Nuts & Washers

Wire & Wire Products

If interested tear out this page and place with letters to be answered.



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

ANNOUNCEMENT



THE ALGOMA STEEL CORPORATION, LIMITED, take pleasure in announcing to their customers and the Canadian trade that in accordance with the widespread desire throughout the Dominion that there should be obtained in Canada with Canadian labor, a much larger proportion of the requirements of this country in STEEL SECTIONS for STRUCTURAL PURPOSES, CAR CONSTRUCTION, SHIPBUILDERS' REQUIREMENTS, etc., they are just completing extensive alterations and additions to their rolling mills, and on or about 1ST NOVEMBER, will be ready to produce and ship American Standard Sections of BEAMS and CHANNELS up to and including 15", all standard sections of ANGLES from 6" x 6" down to 1 1/4" x 1 1/4", ZEE BARS for car builders and general purposes, small and large ROUNDS and SQUARES, and FLAT BARS up to 14" wide. The quality of the product is already well known to the trade, and is exclusively steel made by the Open Hearth process, and can be furnished in all grades from the softest rivet stock to high carbon special spring material.

The following are the sections which will be rolled:---

ANGLES—Equal Leg—

6 x 6"—5 x 5"—4 x 4"
 3 1/2 x 3 1/2"—3 x 3"
 2 1/2 x 2 1/2"—2 1/4 x 2 1/4"
 2 x 2"—1 1/2 x 1 1/2"
 1 1/2 x 1 1/2"—1 1/4 x 1 1/4"

ANGLES—Unequal Leg—

6 x 4"—6 x 3 1/2"—5 x 4"
 5 x 3 1/2"—5 x 3"—4 1/2 x 3"
 4 x 3 1/2"—4 x 3"—3 1/2 x 3"
 3 1/2 x 2 1/2"—3 x 2 1/2"—3 x 2"
 2 1/2 x 2"

BEAMS—

15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—

15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEEs—

3 1/4 x 5 x 3 1/4 x 5/16
 3 5/16 x 5 1/16 x 3 5/16 x 3/8"
 3 x 5 1/2 x 3 x 7/16"
 3 1/16 x 4 x 3 1/16 x 1/4"

3 1/4 x 4 1/16 x 3 1/4 x 5/16"
 3 3/16 x 4 1/8 x 3 3/16 x 3/8"
 2 11/16 x 3 x 2 11/16 x 1/4"
 2 1/4 x 3 1/16 x 2 1/4 x 5/16"

ROUNDS—

All sizes from 1/2" up to and including 4".

SQUARES—

All sizes from 1/2" up to and including 3".

FLATS—

All sizes from 1 x 1/4" up to and including 14" wide.

MINE RAILS—

All sections from 12 lbs. up to and including 45 lbs. per yard.

PIG IRON—

Machine cast FOUNDRY MALLEABLE and BASIC.

SULPHATE OF AMMONIA.

NITRE CAKE.

For the better convenience of customers who may find it necessary to secure rush shipments of particular items, they contemplate keeping a large stock of all the various standard sections constantly on hand, and to this end extensive warehouse facilities are being prepared.

Your enquiries and business will be appreciated.

ALGOMA STEEL CORPORATION

SAULT STE. MARIE, ONTARIO



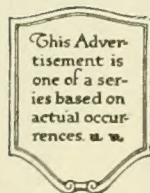
"Oakite Saves \$83.52 Weekly on Cleaning"

ONE cleaning operation in this plant is the washing of small brass parts which are covered with rubber compound—hard to remove.

Formerly used 74 pounds of soda ash daily—and 5 girls were employed in scrubbing the parts with soap after leaving the tank, to remove sediment caused by soda ash.

Oakite has replaced the soda ash. Only 5 pounds of Oakite are used daily. The work comes from the tank absolutely clean. No sediment. No scrubbing. The girls are being usefully employed elsewhere in the plant.

Oakite has saved this plant \$13.92 *daily* in this one cleaning operation alone—or \$83.52 a week.



Just another reason why it pays to have an Oakite Service man pass judgment on YOUR cleaning room. Competent advice without obligation.

Correspondence Invited

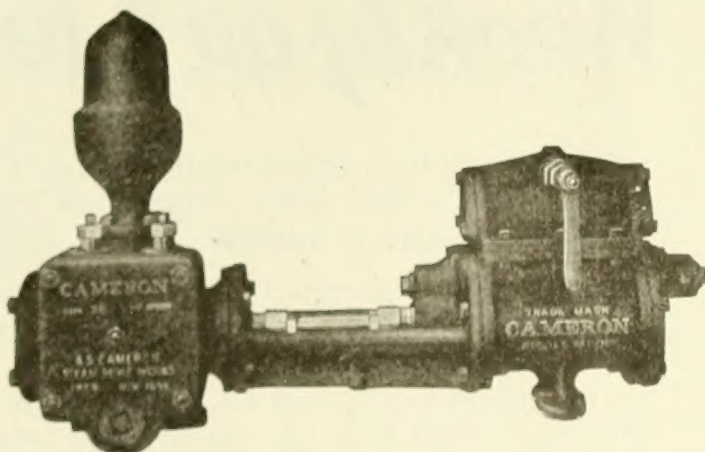
OAKITE MANUFACTURED BY
OAKLEY CHEMICAL CO.
26 THAMES STREET · NEW YORK

If interested tear out this page and place with letters to be answered.

The Cameron Pump and Simplicity

Simplicity is one of the main features of Cameron design. Nothing fussy is incorporated in the design of any Cameron pump and easy access for cleaning is kept in view. The centrifugal Cameron is horizontally split, so that water connections do not need to be disturbed for inspection. Steady service is insured by careful construction, and so certain are we of the reliability of the Cameron pump that every pump is sold with a liberal guarantee.

**Bulletin 7150 shows typical Cameron
pump efficiency curves---based on
average performance**



**Canadian Ingersoll-Rand Company
Limited**

SYDNEY

SHERBROOKE

MONTREAL

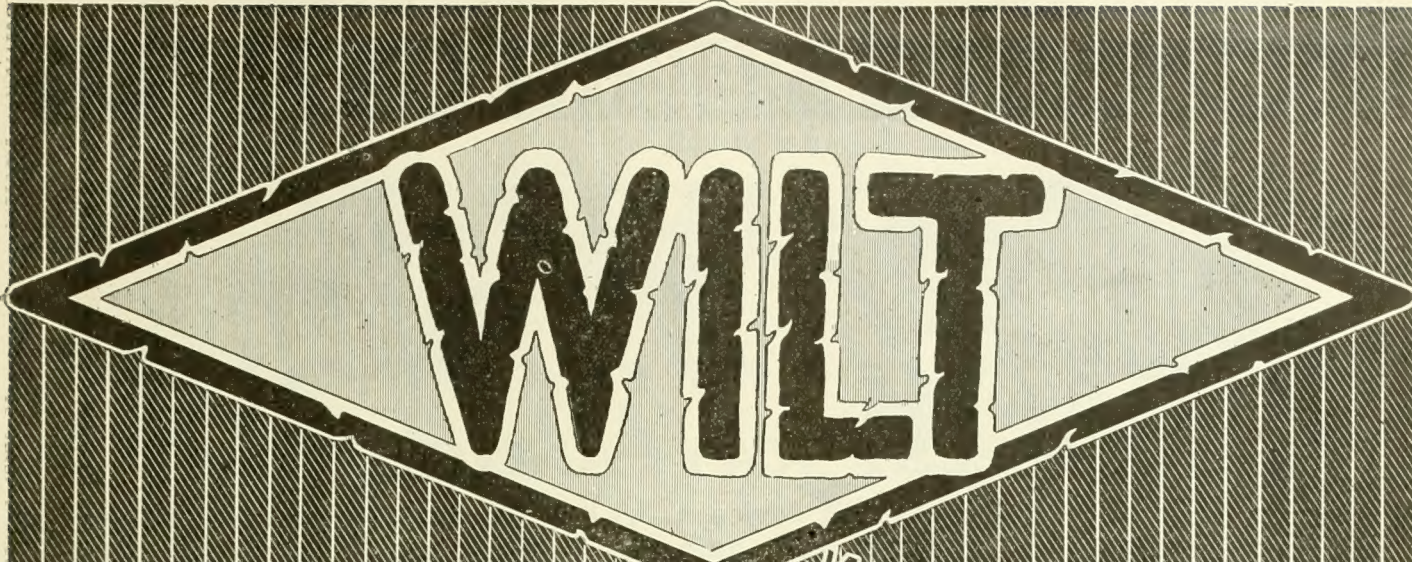
TORONTO

[COBALT

WINNIPEG

NELSON

VANCOUVER



Where there's a WILT - there's the Way

HIGH SPEED AND CARBON TWIST DRILLS

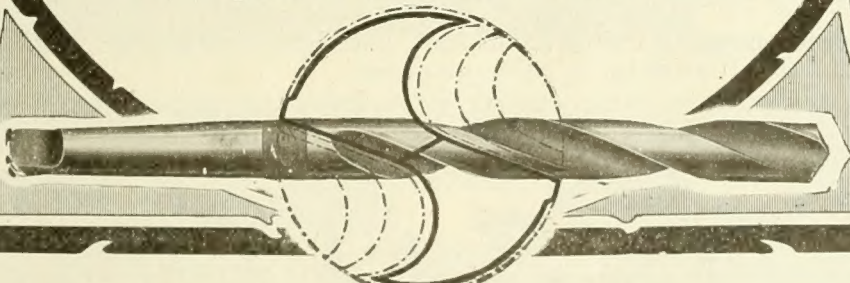
Reamers and Milling Cutters

Unusual Drills Backed by Unusual Policies

Every superintendent should investigate the unusual qualities of
WILT Twist Drills, Reamers and Milling Cutters

The "WILT" has stood the test of all conditions—it is here to stay—its
popularity among the mechanics makes that a certainty.

**Investigate "WILT DRILLS" and
you'll buy no others**



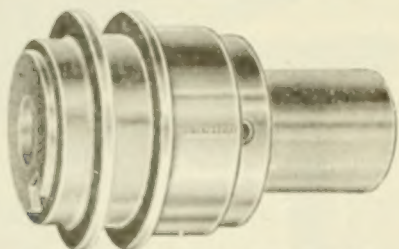
**WILT TWIST DRILL CO.
OF CANADA LIMITED**

WALKERVILLE - - - ONTARIO

LONDON OFFICE: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, Eng.

If interested tear out this page and place with letters to be answered.

THE JOHNSON FRICTION CLUTCH



SINGLE CLUTCH--EXTERIOR



THE SIMPLEST WAY—AND THE BEST

In a clutch or any other mechanical device, unnecessary complication means trouble. Make a single part serve where two have been used before, and you have reduced by one-half the places that can break, wear or get out of adjustment. Put the cost of extra material into better material, and you have doubled the length of service.

In the Johnson clutch, this idea has been followed out to its practical limits. The result is a model of simplicity in clutch construction—a few sturdy parts, each correctly built and accurately tested for the duty it must perform. This lack of complication means continuous service and low maintenance cost. Johnson Friction Clutches stay on the job.

WE CAN BUILD TO SUIT YOUR NEEDS

WRITE FOR OUR YELLOW DATA SHEETS

CANADIAN AGENTS:

WILLIAMS & WILSON, LIMITED, 84 Inspector Street, Montreal.

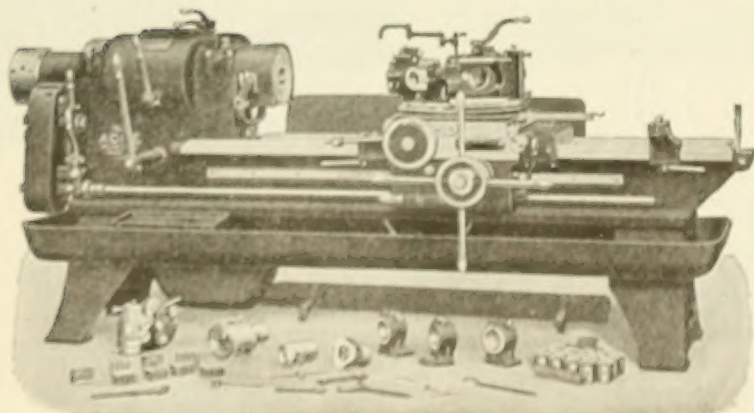
CANADIAN FAIRBANKS-MORSE CO., LIMITED, Montreal, Toronto and Winnipeg

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Doubly Efficient—Does Both Bar and Chuck Work

This Cincinnati Acme Flat Turret Lathe is a double-production, geared head machine of the sliding gear type. It operates on minimum power because the only gears running are those doing the actual work.

This machine saves remarkable time and labor machining either bar work or chuck work up to 16 in. diameter.



31 in. x 36 in. Flat Turret Lathe, Equipped for Bar Work.

Head is cast solid with the bed. You know what that means: accuracy, rigidity, constant and perfect alignment of spindle with vee, upon which the turret carriage travels.

We also make a full line of Screw Machines and Turret Lathes.

Write for Valuable Bulletin

**The Acme
Machine Tool Co.
Cincinnati, Ohio**

Canadian Agents: Rudel-Belnap Machinery Co., of Montreal and Toronto

It is the duty of all to

BUY VICTORY BONDS

*and, by supporting the present Loan, to maintain Canada's credit
and secure her future prosperity.*

Canadian Steel Foundries, Limited
Montreal



**Coal
Coke
Iron Ore**

Pig Iron

Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
Port Colborne, Ontario, Canada

M.A. HANNA & Co.

Sales Agents:
CLEVELAND

Canadian Office:
904 C.P.R. Bldg., Toronto

FIRTH'S

Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS

Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES

440 St. Paul St. West, MONTREAL

75 West Adelaide St., TORONTO

J. A. SHERWOOD

Canadian Manager

If interested tear out this page and place with letters to be answered.

FORD-SMITH

Grinders

*A fine example
of high grade
material and
workmanship*



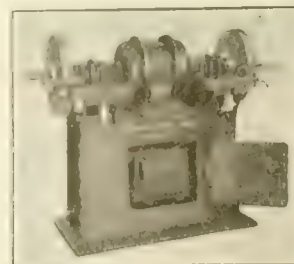
General Purpose Grinder



Water Tool Grinder

FOREIGN AGENTS:

W. E. Storey, 3 Arundel St., London, Eng. Alf.
Herbert, Limited, 54 Dey St., New York, U.S.A.



Motor-Driven Floor Grinder

Motor-Driven Grinders
Floor Grinders
Bench Grinders
Water Tool Grinders
Swing Grinders
Disc Grinders
Special Grinding
Machinery
Hack Saws
Swivel Tables

Write for Catalogue
and price list.

**The Ford-Smith
Machine Co., Ltd.**

HAMILTON - ONTARIO

Canada Fights to Win

When Canada fought—Canada fought to win.

We are now in the midst of another campaign.

The Victory Loan is a campaign to raise money to pay the obligations that the war has left us, and to keep Canada prosperous.

The Victory Loan 1919 calls for vigorous individual and concerted action. It is a national platform on which all citizens concerned in their country's prosperity and welfare can, without reservation, take a strong, emphatic stand.

The Victory Loan 1919 is the "clean up" chapter in Canada's War History—it is needed to round out the most glorious of our achievements.

It is needed to "carry on" the National Business—to successfully bridge the period from War to Peace—and to speed our country along the highway of international commerce in successful competition with other great nations.

Your personal co-operation is imperative. Your support is vital.

It is unthinkable that Canadians—united for years when things looked dark—would not, in the same spirit of patriotism, unite in this last great war effort.

Let us show the world again that what Canada undertakes Canada accomplishes.

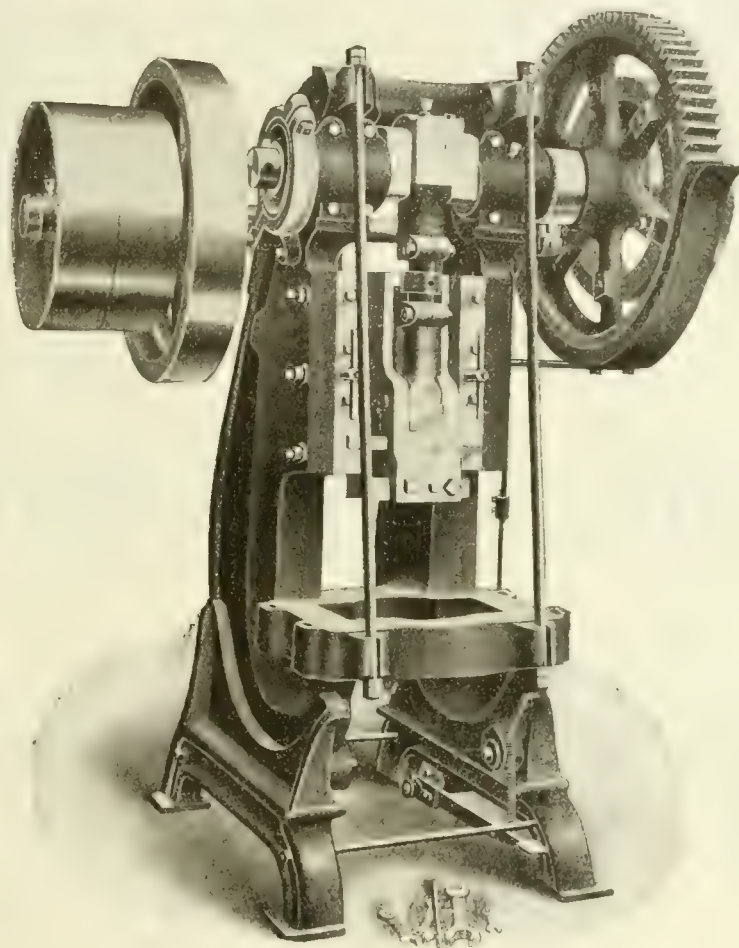
Buy Victory Bonds

Every Dollar Spent in Canada

This space donated to the Victory Loan 1919 Campaign by
The Ford-Smith Machine Co., Limited

Hamilton, Ont., Canada

For Your Pressing Needs



No. 215 Inclinable Geared Press

Quality that is **"Built In"** stands out on all B.B. Power Presses.

The long slides insure accurate work and long life to your dies. The steel pitman screw gives added strength at a vital point.

The Crankshafts are made from high carbon steel forgings and are **"Heat Treated"** so as to give the maximum shock-resisting qualities and prevent crystallization. This is a feature no other press manufacturer can claim.

Let us quote on your next presses. The machines are the best that can be produced and our prices are low in comparison with the value you will get.

The Brown Boggs Co., Limited

Hamilton, Canada

Manufacturers of Presses, Shears, Rolls, etc., also Tinsmiths' Tools and Sheet Metal Working Machinery of every description.

BRITAIN'S BEST

KE

BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and
Cold Rolled Strips, Cold Drawn
Cast Steel, Wire and Drill Rods
HIGH GRADE STEEL FOR ALL PURPOSES



our Principal Trade Marks

KAYSER ELLISON & CO LTD

ESTABLISHED 1825
Complete Stock

SHEFFIELD, ENG.
Montreal Warehouse

RALPH B. NORTON

Agent

126 Craig St. West

Montreal, Que.

CANADA FOUNDRIES & FORGINGS LIMITED

ENDURANCE TOOLS

NEVER WEAR OUT

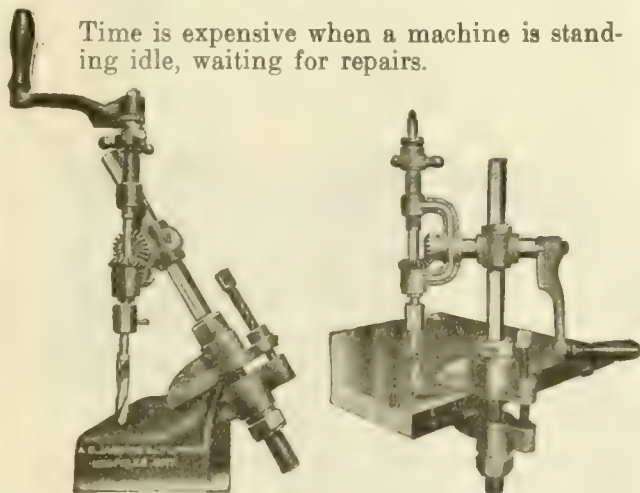


PIPE THE WRENCH—WRENCH THE PIPE

Canadian Billings & Spencer Plant
Welland, Ont.

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, \$26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

LOCOMOTIVE AND CAR WHEEL TYRES

HIGH-SPEED AND CARBON TOOL STEEL

MISCELLANEOUS SHOP TOOLS

MADE IN CANADA

ARMSTRONG WHITWORTH OF CANADA, LIMITED

Head Office :

298-300 St. James Street,
Montreal

Works :

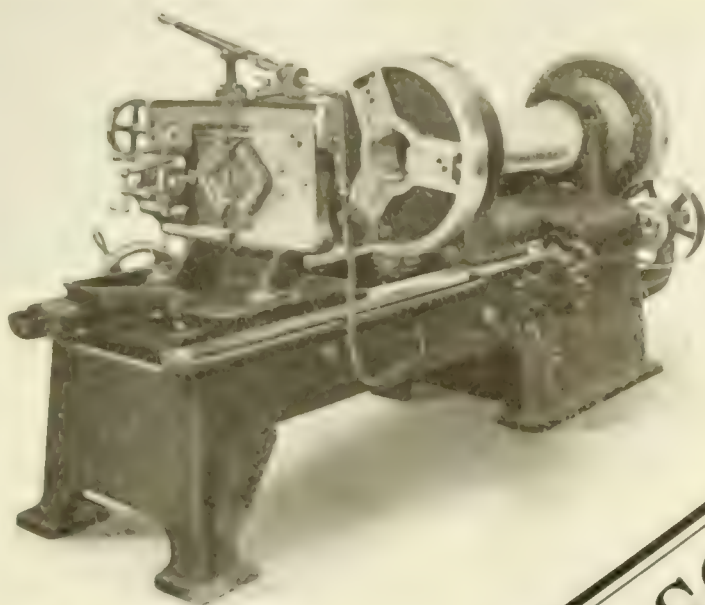
Longueuil, Que.

Branches :

126 Wellington St. W.
TORONTO

27 King William St.
HAMILTON

McArthur Building
WINNIPEG



No. 6 Belt Drive
Capacity $1\frac{1}{4}$ to 6"
Built to
Last

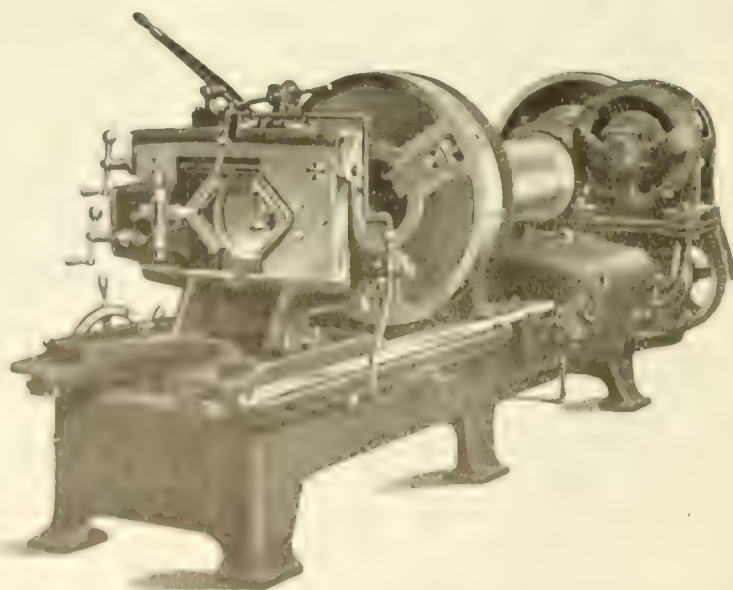
OUR SPECIALTY
PIPE MACHINERY

JOHN H. HALL & SONS, LIMITED
BRANTFORD, ONTARIO
MANUFACTURERS OF
Pipe Threading Machinery

All
Sizes
Pipe Machines
Nipple Machines
Roller Pipe Cutters

No. 8 Motor Drive
Capacity $2\frac{1}{2}$ to 8"

Write for new
Descriptive Bulletins
Just Issued



An Exchange of Money That Pays

When you buy Victory Bonds, you simply exchange one kind of money for another.

A dollar bill is Canada's promise to pay.

So are Victory Bonds.

But Victory Bonds pay INTEREST.

Consider the security behind Victory Bonds—

Canada and all that is contained therein.

Consider the good rate of interest—

Victory Bonds pay $5\frac{1}{2}\%$ —nearly twice as much as Savings Banks.

Consider the saleability of Victory Bonds—

Their use as collateral for a loan.

Their prospective advancement in price.

Consider the purpose for which Canada requires the money:—

Cleaning up our obligations to the army and maintaining the prosperity of the country.

Are not these reasons the best in the world for exchanging one kind of money for another?

Should not every Canadian put all his weight behind this Loan?

Should not he exchange all the money he has for Victory Bonds?—and all the money he can save for the next ten months to come?

Buy Victory Bonds

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN CAMPAIGN BY

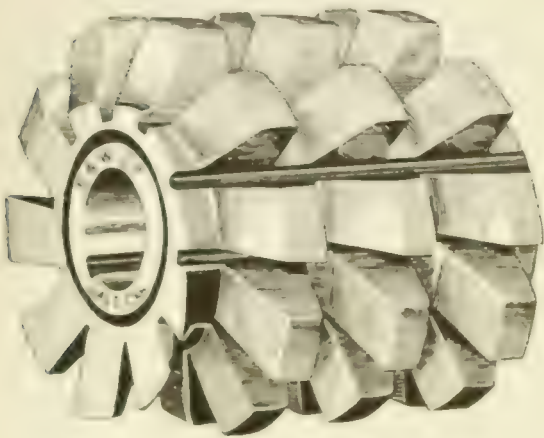
ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ontario, Canada

Elliott & Whitehall

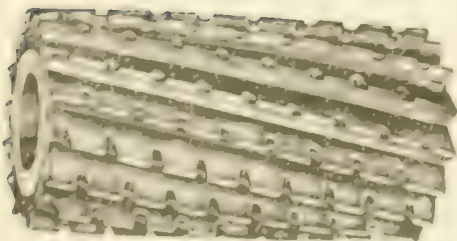
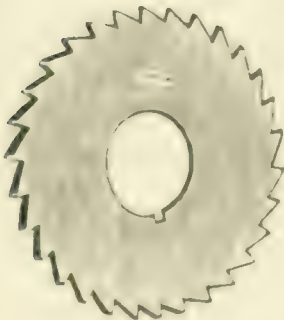
Galt, Ontario



Plain Milling Cutters, Side Milling Cutters, End Mills, Angular Cutters, Convex Cutters, Concave Cutters, Interlocking Side Milling Cutters, Special Cutters, Gear Cutters, etc.

Hand Reamers, Shell Reamers, Chucking Reamers, Taper Pin Reamers, Lathe Mandrels, Arbors, Gauges, Jigs and Fixtures, Metal Stamping Dies, etc., etc.

Ask for a our New Catalogue

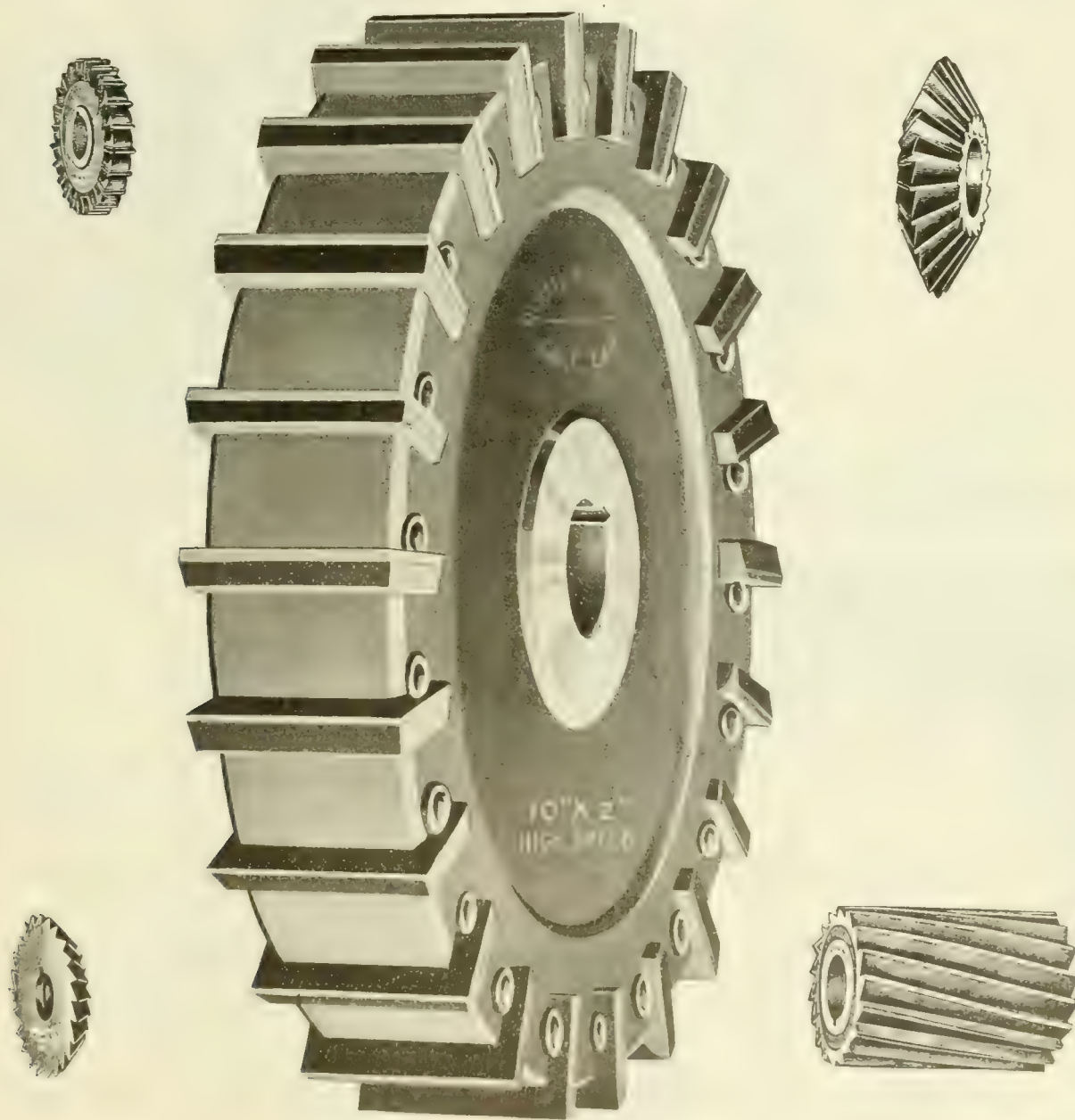


Elliott & Whitehall

Manufacturers of High Grade

Galt, Ontario

Machine and Tool Co. o, Canada



Machine and Tool Co.

illing Cutters and Small Tools

o, Canada

If interested tear out this page and place with letters to be answered.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

**Nova Scotia
Steel and Coal
Co., Limited**

Head Offices:
New Glasgow, N.S.

Western Sales Offices:
Room 14 Windsor Hotel
MONTREAL



Steel Ingots

by the

HARMET

Liquid Process

**Swedish Steel & Importing
Co., Limited**

Montreal
New York

Toronto
Denver

Direct representa-
tions of foremost
Swedish mill-
makers of

Tool Steels

ALLOY STEELS, BILLETS,
BARS, DISCS, SHEETS,
HIGH SPEED STEELS,
DRILL RODS, DRAWN
BARS, SEAMLESS TUB-
ING, COLD ROLLED STRIP
STEEL, WELDING WIRE,
WROUGHT AND ROLLED
IRON, PIG IRON, STEEL
AND IRON ENDS, HOL-
LOW AND SOLID MINING
DRILL STEEL.



PROMPT SHIPMENTS
from large stock

ES&M

ELECTRIC Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings
for estimates.

**THE ELECTRIC STEEL AND METALS
COMPANY, LIMITED**

WELLAND

ONTARIO

IF YOU DON'T—WHO WILL?

If you don't

buy Victory Bonds and assist Canada to fulfil her debts of honour to her army—

Who will?

If you don't

buy Victory Bonds and enable Canada to provide credits to Great Britain with which to buy Canada's surplus farm products—

Who will?

If you don't

buy Victory Bonds and assure Canada the opportunity to extend credit to Great Britain with which to purchase our surplus manufactured products and keep our factories humming

Who will?

If you don't

buy Victory Bonds and enable Canada to grasp her golden opportunity to hold and extend her overseas markets and assure good times and good wages at home—

Who will?

If you don't

buy Victory Bonds and do your part to insure your business or your job—

Who will?

BUY VICTORY BONDS TO THE LIMIT

This space donated to the Victory Loan 1919 Campaign by

H. A. DRURY STEEL COMPANY, LIMITED

MONTREAL

TORONTO

NEW YORK

"WACO"

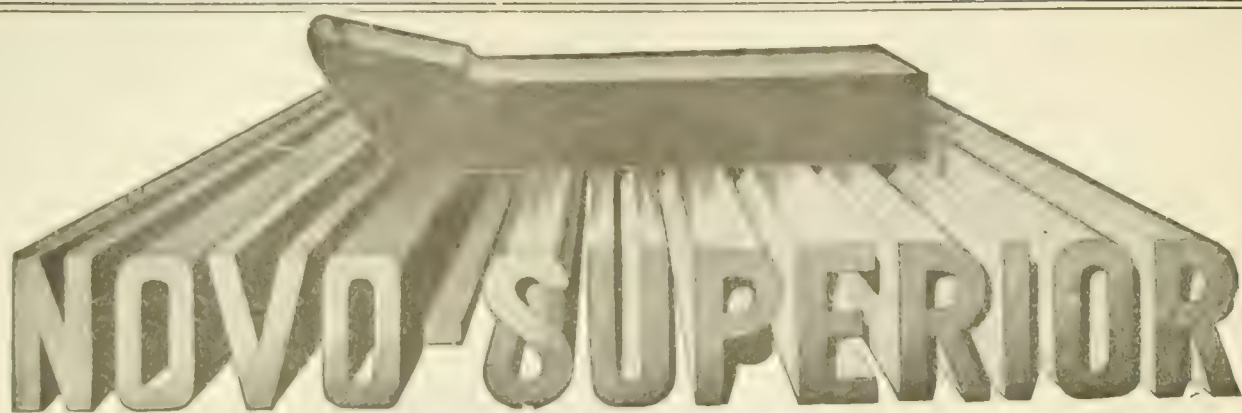
THE HIGH SPEED STEEL

MARSHALL, SON & BUNNEY
39 Richmond Street East TORONTO, ONT.

SOLE CANADIAN AGENTS FOR
WM. ATKINS & CO., LIMITED
SHEFFIELD - - ENGLAND

ALL SIZES
IN STOCK

If interested tear out this page and place with letters to be answered.



NOVO-SUPERIOR

HIGH SPEED STEEL

INTRA STEEL

GIBRALTAR STEEL

Tool Steel for Every Purpose

SWEDISH LANCASHIRE IRON.

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.

Music Wire for Springs, Steel Balls

Cold Rolled Tool Steel in Strips and Sheets.

We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws—for wood and for hot or cold metal cutting

Machine Knives—for cutting wood, paper, tobacco, agricultural.

PILOT STEEL & TOOL COMPANY, Limited, 322 St. James St., MONTREAL

Sole Agents for

JONAS & COLVER, LIMITED

Novo and Continental Steel Works, Sheffield, Eng.

H. BOKER & CO., Inc.

New York, N.Y.

Harris Heavy Pressure

The Babbitt Metal that's at the Front in Efficiency and Economy



Order a Box from our nearest Factory

Our Guarantee is Back of Every Pound of Babbitt Metal We Make

Manufactured by

The Canada Metal Company, Limited

TORONTO
HAMILTON
MONTREAL

CANADA
WINDSOR
NEW YORK



XXX

Genuine Arctic Metal

will give satisfactory results in the most troublesome bearings. Will last longer and save many times its cost in repairs. Will reduce your overhead expense.

Tallman Brass & Metal Limited
HAMILTON, ONT.

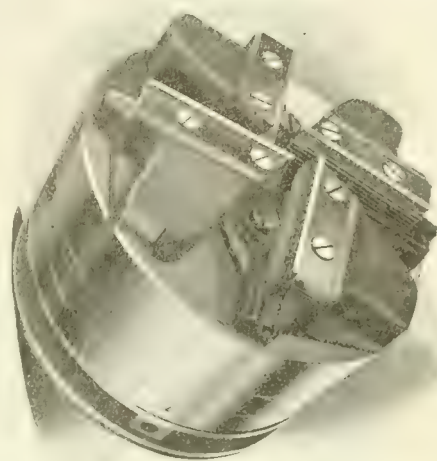
APPLY THE LANDIS DIE HEAD TO YOUR THREADING MACHINE

Landis Bolt or Pipe Threading Heads applied to your threading machine give you all the advantages of the Landis chaser. The application is very simple, merely requiring an intermediate flange which we will gladly furnish.

The Landis head on your old machine will revolutionize threading in *your* shop just the same as it has in many other shops. You will then appreciate the variable rake or cutting angle of the chaser, the interchangeability, the absence of annealing, hobbing and retempering and the exceptionally long life.

Landis heads are daily being applied to other makes of threading machines and our customers report better threads, double production and a much lower cost of upkeep. Landis-ize your shop. Get full details at once.

LANDIS MACHINE COMPANY
Waynesboro, Pa.



CURTIS TROLLEYS

Increase Production Save Man Power

CURTIS Single I-Beam Trolleys are being used by progressive firms to obtain the highest operating efficiency. A Curtis Heavy Duty Bearing Trolley with a 4000-lb. load can be moved by a 50-lb. pull, while ordinary trolleys require nearly twice as much power to move the same weight.

Curtis Trolleys are constructed with large inclined wheels and self-equalizing deck side frames, so that each wheel always bears its fair proportion of the load. They are equipped with shock absorbing Hyatt Flexible Roller Bearings, which insure the trolleys' starting, easy riding and long-lasting. Full information and descriptive literature on request.

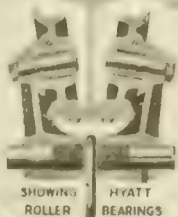
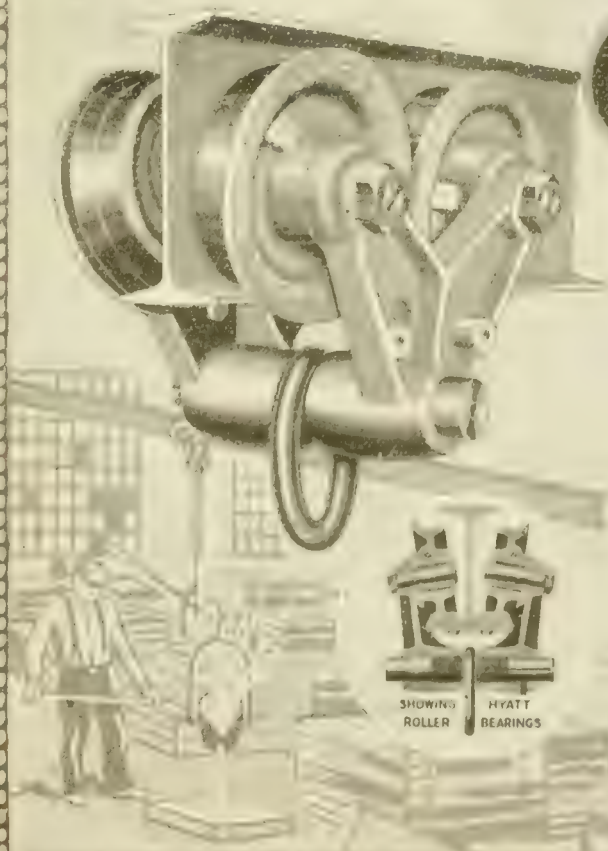
CURTIS PNEUMATIC MACHINERY CO.

1585 Kienlen Avenue

St. Louis, U. S. A.

Branch Office

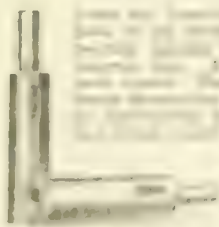
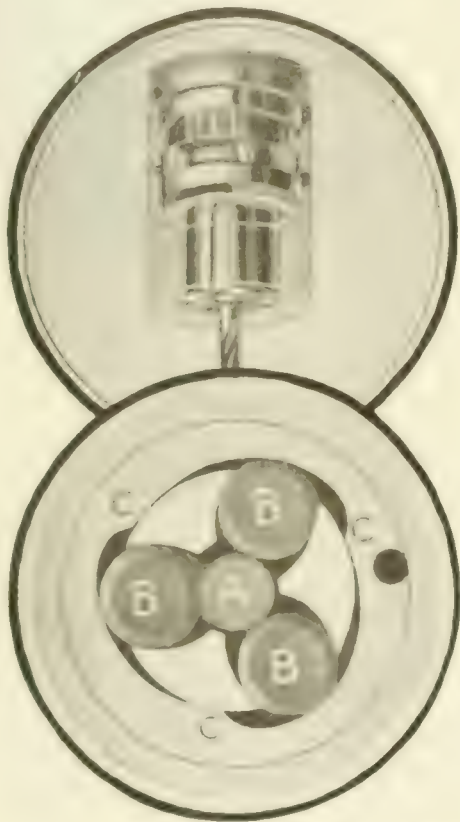
502-A Hudson Terminal, New York City



If interested tear out this page and place with letters to be answered.

SKF AUTOMATIC-QUICK ACTING SELF CENTERING DRILL CHUCKS

Suggestion →
No. 3



For Tapping
Hex Nuts

Drill Spindle

SKF Chuck

Long Shank Tap

Special Die for Holding
Various Sized Nuts



**The Drill Spindle
keeps turning in
one direction
continuously**

As each nut is tapped the drill spindle is lifted and the nut is carried up on the shank of the tap. When the shank is filled, the whole tap is taken from the S K F Chuck, the nuts dropped off, and the tap reinserted—all without stopping the drill spindle.

The same S K F Chuck that makes this possible has set new standards for automatic drill chucks—with its perfect centering device, its special roller jaws, and its entirely automatic action.

There is no limit to the uses to which the S K F Chuck can be put. Our engineering service department is at your call.

CANADIAN SKF COMPANY, LIMITED

EASTERN SALES OFFICE :

412 ST. JAMES ST.,
MONTREAL

HEAD OFFICE :

KING ST. WEST,
TORONTO

Can You Forget?

As long as you live you'll remember November 11th, 1918
—Armistice Day.

That was the day the enemy surrendered.

That was the day of Victory for our army.

Day after day—year after year—through rain, cold, heat, mud, death—they had fought bravely, stubbornly, cleverly, faithfully—the spearhead of fate pointing inexorably at the black heart of the enemy.

Remember the Somme? Ypres? Vimy? Passchaendale? Cambrai? MONS?

Can't you catch this brave spirit?

Can't you see how small is our task compared with theirs?

Shall we fail to lend our money to the country for which they gave their lives?

The Victory Loan 1919 must be a victory, too. It is needed to pay our obligations to the army and to keep the fair name of Canada writ high among the nations.

This is a War Loan.

Canada needs to borrow your money.

If the Victory Loan succeeds it will be another Mons for Canada.

Let us show the world again that what Canada undertakes, Canada accomplishes.

Buy Victory Bonds

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN 1919 CAMPAIGN BY

CANADIAN **SKF** COMPANY, LIMITED

Eastern Sales Office:

412 St. James St. West, Montreal, Que.

Head Office

47 King St. West, Toronto, Ont.



ELECTRICITY

High Speed Steel

SEVERAL factors combine to make this high-speed steel a triumph of the steel-maker's art; Electric Furnaces — entirely infallible, automatically regulated, delivering the same result time after time.

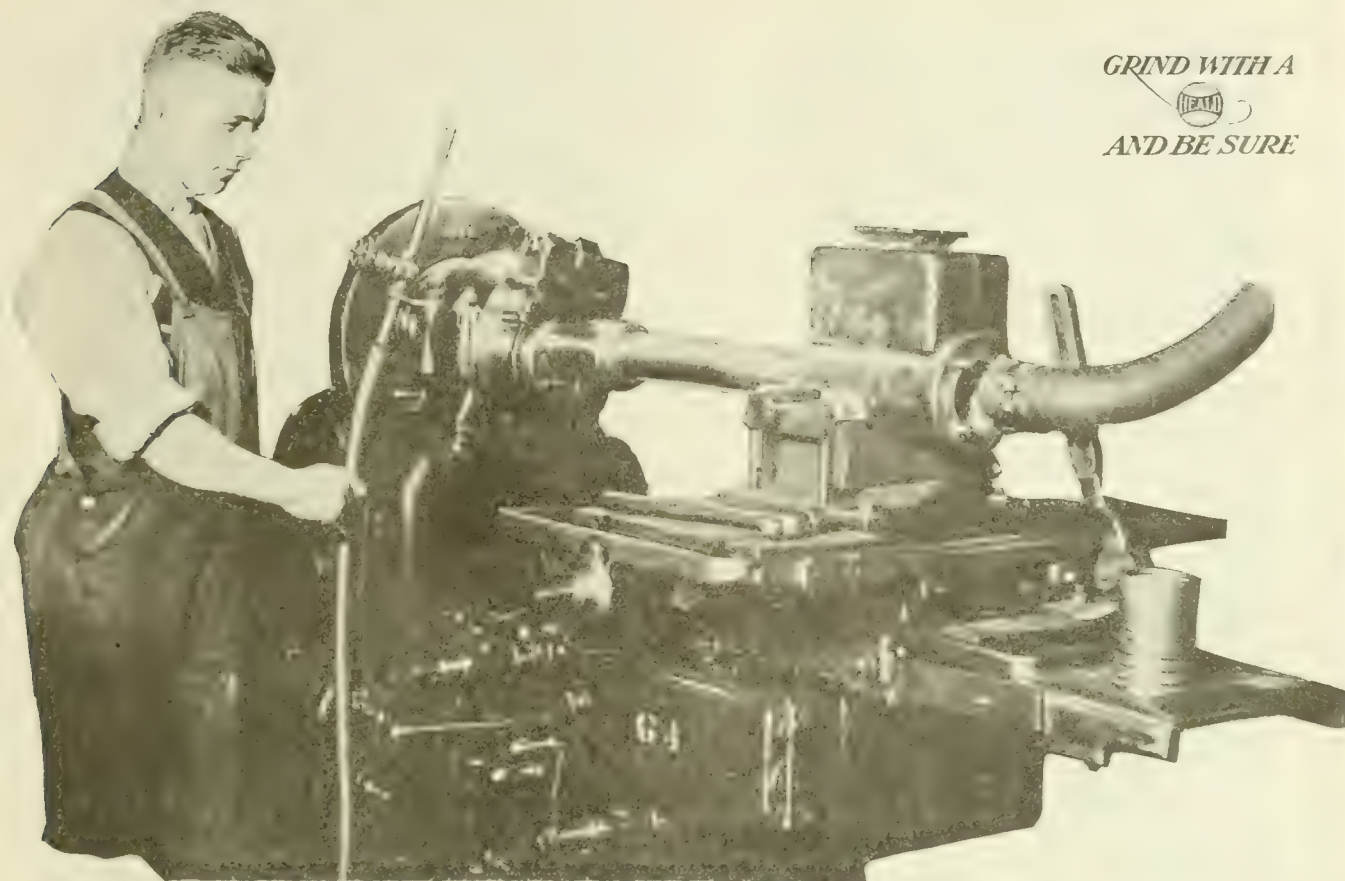
Uranium — This rare element, cousin to Radium, effects a profound change in the texture and quality of the steel.

Added to these, the constant care and skill of years of steel-making experience make the result of each melt a foregone conclusion.

Latrobe Electric Steel Co.

LATROBE, PENN.

URANIUM



ECONOMY IN GRINDING STATIONARY GAS ENGINES

The John Lauson Mfg. Co., of New Holstein, Wis., at whose factory the above photograph was taken, makers of stationary gas engines, are convinced that the Heald No. 60 Cylinder Grinding Machine increases production and accuracy, while reducing the cost of manufacturing by grinding bores.

They have demonstrated that ground cylinders will cut the testing of running in time 50% or better and will produce a more desirable and economical engine.

In their catalogue they state that their cylinders and pistons are ground to size,

which assures a smooth, round cylinder that will hold compression under all conditions, will last longer and deliver more power and require less lubricating oil than the bored type.

The above conditions are true not only of stationary engines, but also of every combustion engine, including automobiles, airplanes and tractors. The Heald No. 60 will grind any part which cannot be readily revolved.

We build internal and rotary grinders, also magnetic chucks. Literature on request.

THE HEALD
MACHINE COMPANY
Worcester Massachusetts

BRANCH OFFICES: New York, 830 Street Bldg.; Portland, 1105 Commercial Bldg.; Chicago, 16 South La Salle St.; Detroit, 401 Marquette Bldg.; Cincinnati, 331 President Bldg.; Boston, 521 Engineers' Bldg.
WESTERN AGENTS: Eick & Smith Co., Los Angeles; San Francisco and Portland; Salt Lake Hardware Co., Utah and Idaho.
FOREIGN AGENTS: Alfred Herbert, Ltd., England; Societe Anonyme, Alfred Herbert, France; Switzerland, Societa Anonima Italiana; Alfred Herbert, Italy; F. W. Horn Co., Japan; W. B. Sorenson & Co., Sweden, Denmark and Norway; Henri Benoit & Co., Belgium; American Machinery Syndicate, Spain and Portugal.

THERE is as much difference in the various makes of High Speed Steel as there is in men—

The practice and methods of manufacturers differ widely in every mill and anyone who is at all familiar with the manufacture of High Speed Steel thoroughly understands this

"Red Cut Superior"

The Nationally known—First Quality

HIGH SPEED STEEL

is the best for all Machine Work

ARE YOUR TOOLS MADE OF "Red Cut"?

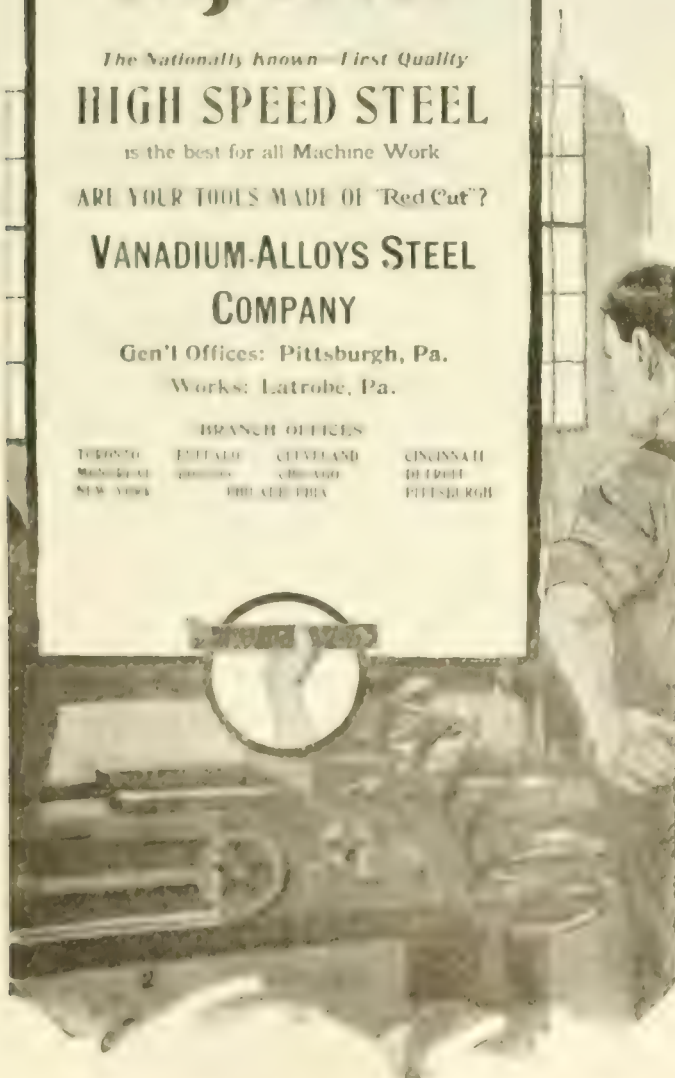
VANADIUM-ALLOYS STEEL COMPANY

Gen'l Offices: Pittsburgh, Pa.

Works: Latrobe, Pa.

BRANCH OFFICES

TORONTO	DETROIT	CLEVELAND	CINCINNATI
MINNEAPOLIS	CHICAGO	PHILADELPHIA	ST. LOUIS
NEW YORK			PITTSBURGH



DUNBAR SPRINGS

ACCURACY ASSURED

You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.

BRISTOL, CONN.



60 Rivets in a Minute

Faster if the work can be fed faster. But at least 60 every minute.

And in tightest corners just as fast. Every head just as smooth. Not a bent shank; not a tool mark on either rivet head or casting.

GRANT

Rivet Spinning Machines



Write today

GRANT MFG. & MACHINE COMPANY

Holland Avenue, Bridgeport, Conn.



Photographs and data by courtesy of our customer.

This "Bliss" No. 5-S Toggle Press is shown producing a cooking utensil that will play an important part in feeding the new national army.

The wash basin illustrated is another of many things this press turns out. It is drawn from 30 gauge pickled and annealed sheet steel, three at once, size 11½ inches. Production on Power Presses varies widely according to the article and the operator's skill. In the case of this basin 1250 per hour is the average. Five years' continuous use without interruption for repairs is a characteristic "Bliss" record.



1857

E. W. BLISS COMPANY

Main Office and Works: BROOKLYN, N.Y., U.S.A.

CHICAGO OFFICE
People's Gas Bldg.

DETROIT OFFICE
Dime Bank Bldg.

CLEVELAND OFFICE
Union Bank Bldg.

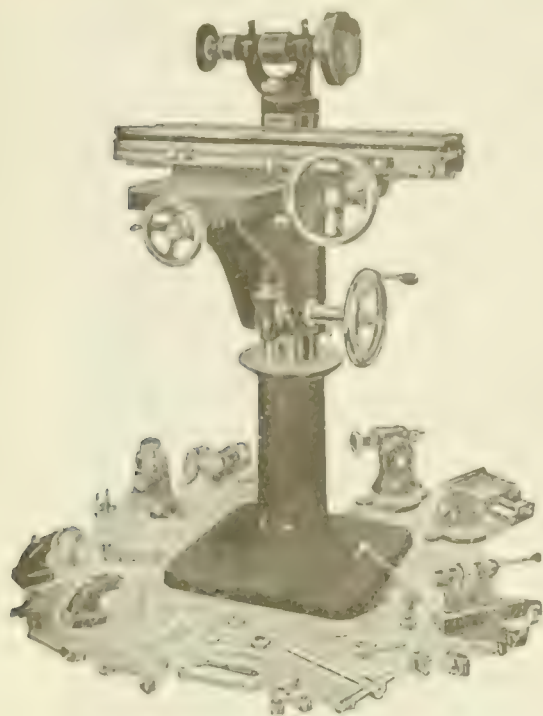


1919

LONDON, ENGLAND, Pooock Street, Blackfriars Road, S.E.
No. 17

PARIS, FRANCE, 100 Boulevard Victor-Hugo, St. Ouen

If interested tear out this page and place with letters to be answered.



The *Greenfield* Universal Grinder

For General Tool Room Work

This grinder is furnished with attachments for grinding all sorts of milling cutters, reamers, counterbores, and other machine shop tools.

It is also suitable for cylindrical, internal and flat work which frequently turns up in the making of tools and jigs.

These attachments are all very simple in design and easily adjusted upon the machine, being graduated so that any desired angles can be at once obtained.

The whole machine is thoroughly well built, well finished, and will be found a dependable, convenient grinder.

Greenfield Machine Company,
GREENFIELD, MASS., U.S.A.



15 H.P. Morse chain drive operating generator from water wheel.

"Renold" or "Morse" Silent Chains

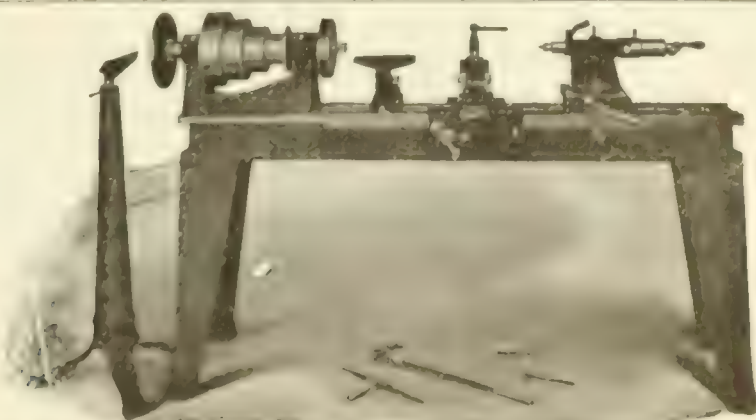
are employed throughout Canada on Main Drives, Municipal Fire Pumps, etc., Evidencing Absolute Reliability.

Jones & Glassco, Regd.

Canadian Agents

Toronto

Montreal



A Favorite—

Blount Pattern-makers' Lathe

FAST AND ACCURATE—Equipped with set over swivel tailstock and carriage, and outside face plate and tripod. Built in 16" swing with beds 6 or 8 feet in length. Spindle is made of high carbon steel, is hollow and fitted with Morse Taper and runs on self-oiling bronze bearings.

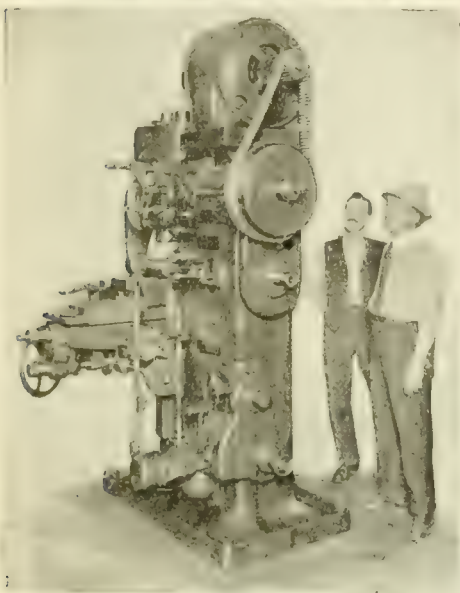
Our catalog gives a full description of this strong and highly efficient machine, also our other quality speed lathes and grinders. Give us your address.

J. G. BLOUNT COMPANY
EVERETT, MASS., U.S.A.

LINK-BELT

SILENT CHAIN DRIVES

For Machine Tools



DRIVE your machine tools with the efficient Link-Belt Silent Chain Drive. In addition to a 20% greater output and a 20% saving in power, you get from four to five times the service on cutting tools, and better finished product.

Remember the following facts about Link-Belt Silent Chain Drives.

1. It is 98.2% efficient (on actual test).
2. Permits convenient location of driving parts.
3. Any reduction in speed is possible.
4. Uniformity of product.
5. Less wear and tear on cutting edges of tools.
6. Increases production.
7. Results in economy of power.
8. Occupies little space.
9. Oftentimes lowers first cost of motors, on account of large speed reduction possible.
10. Oftentimes reduces horse power and cost of motor required.
11. Not restricted to motor drives, but suitable, for instance, for driving from shaft to shaft, as integral parts of machines.
12. Overloads taken care of without diminution of speed.
13. Our casings assure "Safety First" to all employees.

CANADIAN LINK-BELT COMPANY, LIMITED

WELLINGTON AND PETER STREETS, TORONTO



Look for the name on the washers;
Look for the liners in the joints.

**Fill in the data —
clip the coupon and
mail it today. It
places you under
no obligation and
brings you prices
and information on
Silent Chain Drives**

367

Link-Belt Company

(Date) _____

Please send us quotation for a silent chain drive to operate _____
We give the following to enable you to figure closely:

Maximum H-P to be transmitted _____

Dis. from center to center of shafts _____

Diam. of Shafts

Revolutions per minute

Max. Wheel Diam.

Max. Wheel Width

Split, Yes or No

Key Seat

DRIVER DRIVEN

Is the load steady, or intermittent as with pumps? _____

Is the chain used in a clean or dirty place? _____

Is the chain subject to shock? _____

How many hours per week will it operate? _____

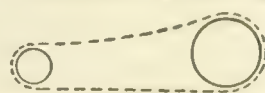
What percentage of time at full load? _____

Are there means of adjusting centres? _____

If there is a longitudinal float or movement, give amount? _____

If to replace belt, other chain or gears, describe same. _____

Indicate Position of Drive
and Direction of Rotation
MARK DRIVER
WHEEL "R"
MARK DRIVEN
WHEEL "N"



Draw line showing relative position of floor

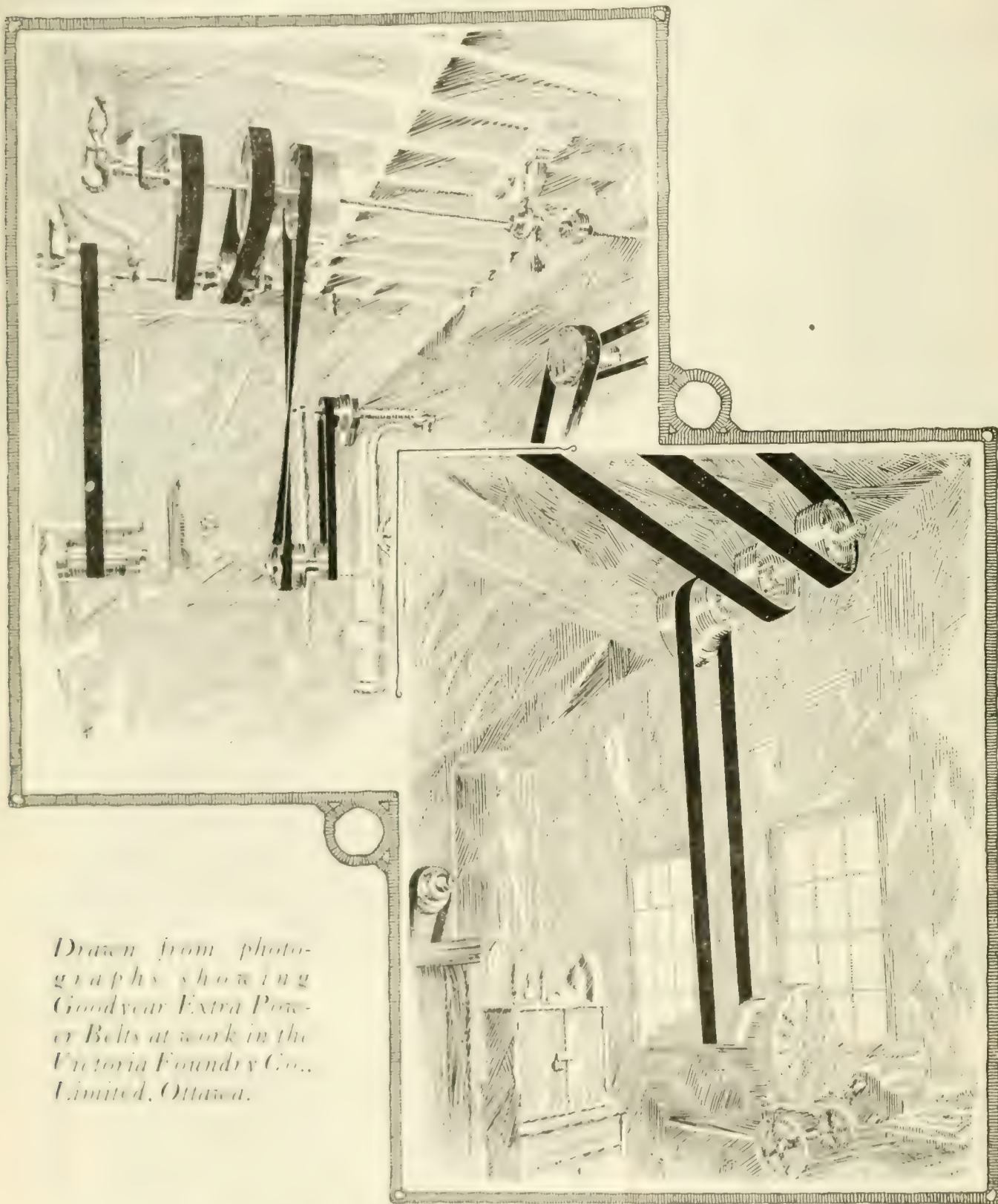
Name _____

Street Address _____

Town and State _____

☐ Please send us literature on the Link-Belt Silent Chain Drive

If interested tear out this page and place with letters to be answered.



Drawn from photographs showing Goodyear Extra Power Belts at work in the Victoria Foundry Co., Limited, Ottawa.

GOOD YEAR
MADE IN CANADA

Reduce Belt Replacement

Changing belts costs money.

Belts which wear out quickly must be replaced frequently.

This costs money for belting.

Costs money for idle machinery.

Costs money for idle hands.

Costs money because piece-workers become dissatisfied.

Goodyear Extra Power Belting reduces belting costs.

It wears long, and so makes the belting itself cost less.

It keeps machinery and men busy, and enables everyone to produce at greatest efficiency.

This has been the experience of ever one of the more than a thousand Canadian plants which use Goodyear Extra Power Belting.

For example, here is what the Victoria Foundry Company, of Ottawa, say about their Extra Power:

VICTORIA FOUNDRY COMPANY, LIMITED, OTTAWA

Gentlemen:

We have certainly had great satisfaction from your "Extra Power" Belting.

We have used it on all kinds of machines. It has been in service a surprising length of time—and is still in service.

For instance—

16 months on the cone of a 30-inch Lodge & Shipley lathe.

18 months on the cone of a 24-inch lathe.

24 months on a 30-inch drill press.

12 months on main drive of a 36-inch planer.

And all still in service. Not a replacement so far. We are mighty pleased.

Yours very truly,

THE VICTORIA FOUNDRY COMPANY, LIMITED.

Men trained by Goodyear to solve belting problems are always available to confer with you. No obligation. Just wire, phone or write the nearest branch.

The Goodyear Tire & Rubber Co. of Canada, Limited

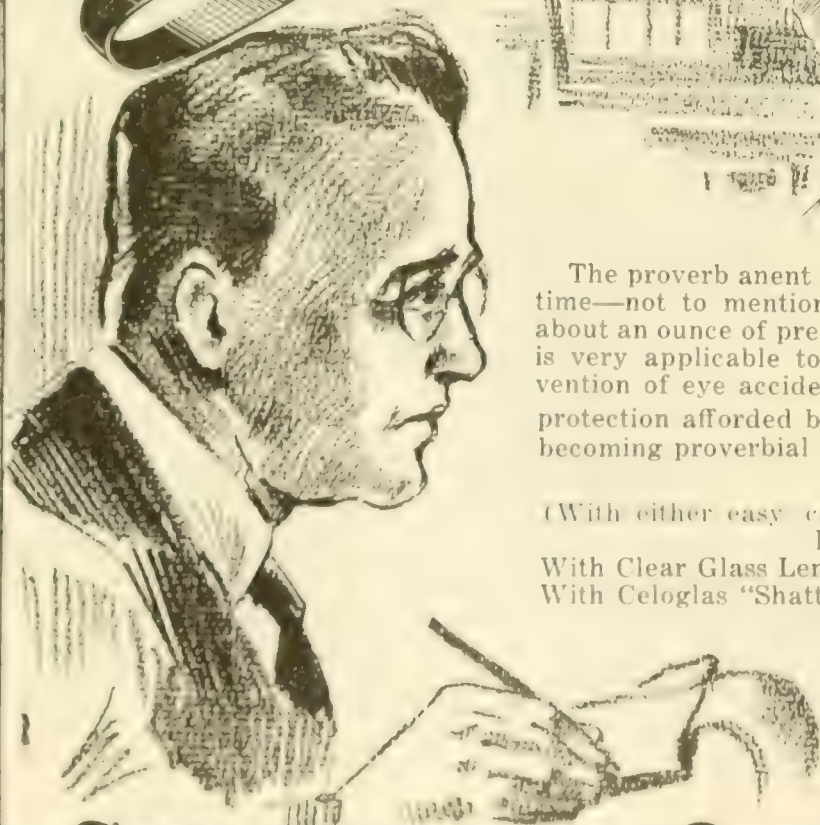
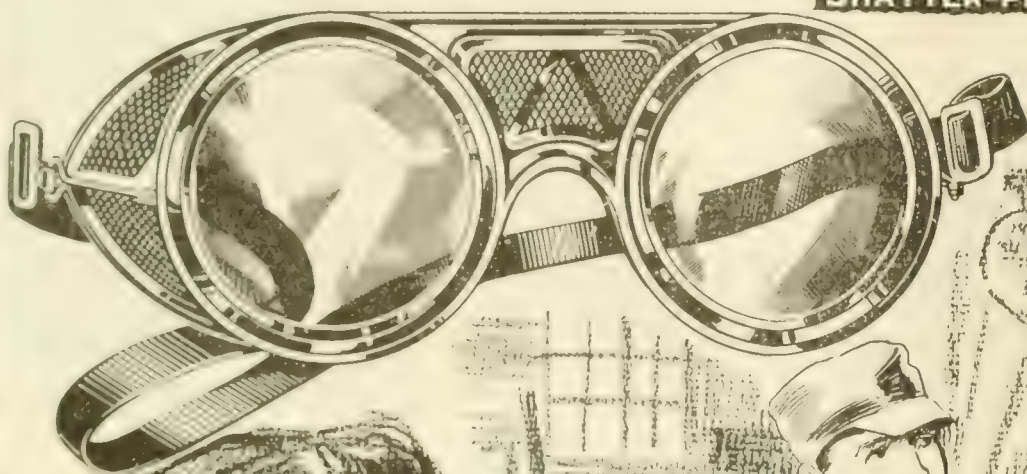
Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton,
London, Winnipeg, Regina, Calgary, Edmonton, Vancouver

EXTRA POWER BELTING

Mr. Safety Engineer, don't
wait for an eye accident before
ordering **STOCO** SAFETY

GOGGLES
"CELOGLAS"

SHATTER-PROOF LENS



The proverb anent a stitch in time—not to mention the one about an ounce of prevention—is very applicable to the prevention of eye accidents. The

protection afforded by **Stoco** Safety Goggles is fast becoming proverbial in industrial fields.

PRICE

(With either easy cable earbows or black elastic headband) Per 100

With Clear Glass Lenses \$115.00

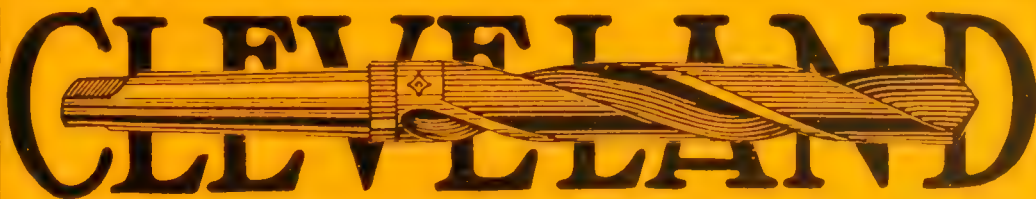
With Celoglas "Shatter-Proof" Lenses..... \$150.00

A sample of the **Stoco** Safety Goggle will be sent without charge to Safety Engineers, Purchasing Agents and Superintendents on receipt of request on letterhead.

STANDARD OPTICAL Co.
GENEVA, N. Y.



They're a
mighty nice
bunch to
deal with—
they handle



THE CLEVELAND TWIST DRILL CO., Cleveland, New York, Chicago
Agents for Europe, CLEVELAND TWIST DRILL CO.-(GREAT BRITAIN), Ltd., 36-37 Upper Thames St., London E.C.4.

MALLEABLE AND CAST IRON PIPE FITTINGS



The Brand That Has The Quality

"Quality" and "Reliability" are two essentials demanded of *Cast Iron* and *Malleable Fittings*, by all sanitary and heating engineers.

Time and money are lost by improperly made fittings. All our cast iron and malleable fittings are properly recessed and every fitting bears the above trade-mark of quality.

We make a complete and full line of both flanged and threaded fittings from $\frac{1}{8}$ -inch up, and can make deliveries from stock, both standard and extra heavy.

When ordering from your jobber be sure you buy—"the brand that has the quality." They are different. A trial order will convince.

International
Malleable Iron Company, Limited
Guelph, Ontario, Canada

Keep Canada Humming

Canada is running a great National Store.

Great Britain and other lands come here to buy our surplus agricultural and industrial products. These are the orders that are keeping Canadians busy and prosperous. That is where the money comes from that is paying our farmers for their surplus products and providing full pay envelopes for our workers.

But Great Britain and our allies are temporarily short of "cash." So Canada must extend them "credit" — just as any storekeeper extends credit to any customer whose financial standing is good.

The success of the Victory Loans 1917 and 1918 made possible the giving of these credits.

Continuation of these credits and the maintenance of our valuable overseas markets—depend upon the success of the Victory Loan 1919.

You will therefore plainly see how closely bound up with the Victory Loan 1919 is the prosperity of everyone in Canada, without exception.

Do not think your individual co-operation "does not matter."

It does matter!

Unless Canadians to the last man support the Victory Loan, it will not be the success that our continuous prosperity demands.

Let every Canadian do his share to keep things humming.

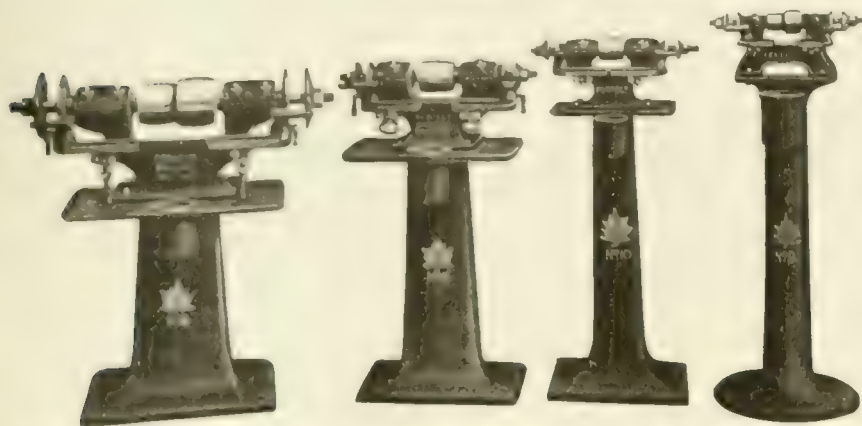
BUY VICTORY BONDS

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN 1919 CAMPAIGN BY
CANADIAN MACHINERY AND MANUFACTURING NEWS
TORONTO, ONT.

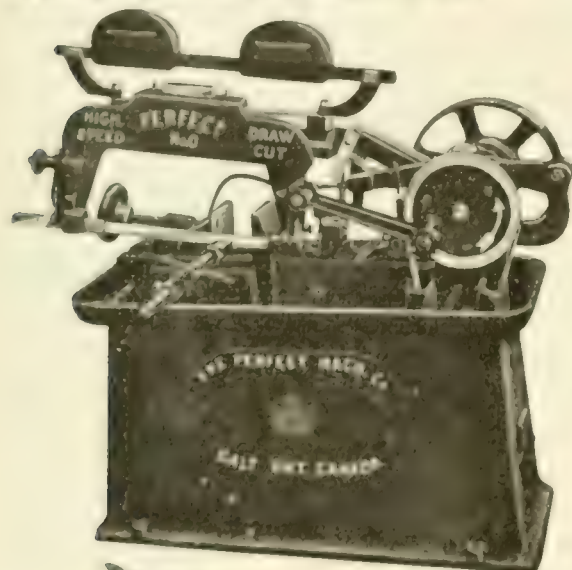
Perfect Machine Co., Limited

Galt, Ontario, Canada



Represented by the
Leading Machinery Houses in Canada
and
in Great Britain
by
Fry's (London) Limited

The Perfect Grinder. They've stood the test; the oiling device can't go wrong; the material, workmanship and service is guaranteed. Guards and exhaust hoods furnished on request, and the price is very moderate when compared with others.



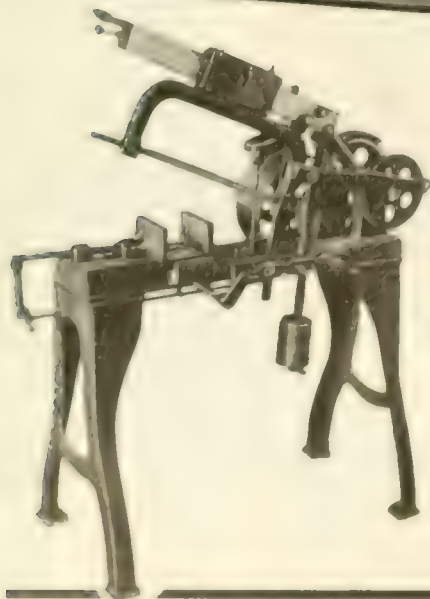
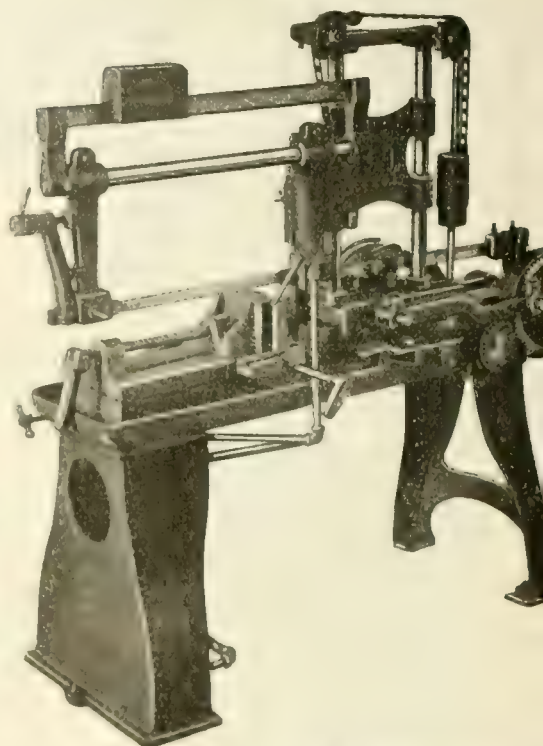
No. 0
**PERFECT
HACK SAW**
Capacity
0" to 5"
or more, on
request.

Speed:
120 R.P.M.
Weight:
600 lbs.

It's a Perfect
Machine.

No. 1
**PERFECT
HACK SAW**
Capacity:
7" x 7".

Speed:
120 R.P.M.
Automatic
Lift.
Adjustable
Frame.
Milled Gears.
Swivel Vise.
Weight:
550 lbs.



No. 2
PERFECT HACK SAW

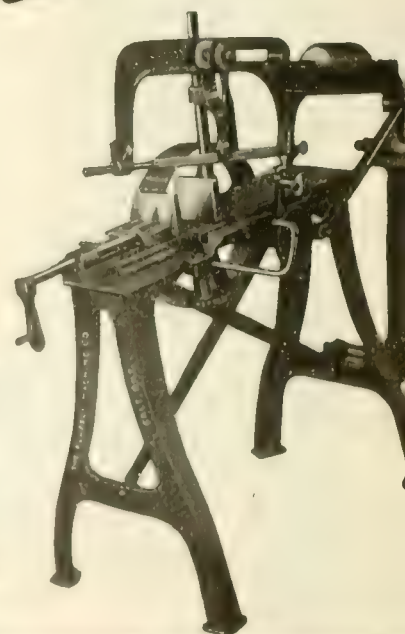
Capacity: 5" x 5"
Speed: 80 R.P.M.

This is a nice
smooth-running
machine,
well worth the price.
You'll appreciate it.

No. 3
PERFECT HACK SAW

Capacity: 6" x 6".

An Ideal, all round
Machine Shop Saw,
always ready,
automatic shut-off,
adjustable arm and saw
guide.

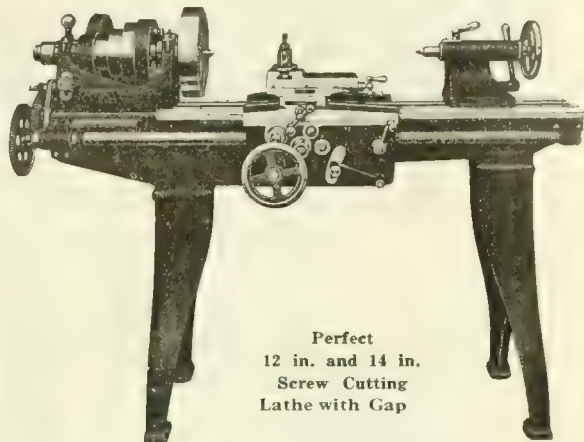


Perfect Machine Co., Limited

Galt, Ontario, Canada



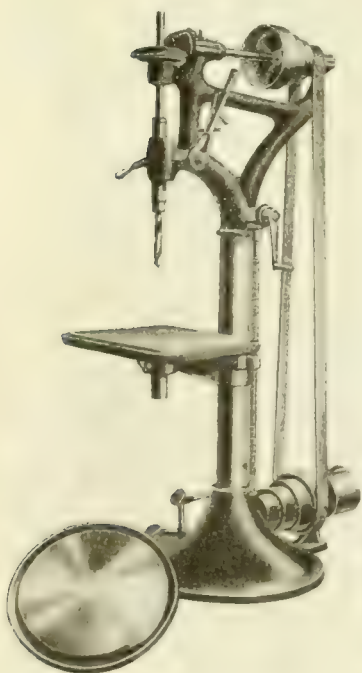
The Perfect 18-in. Lathe—all that it looks to be.



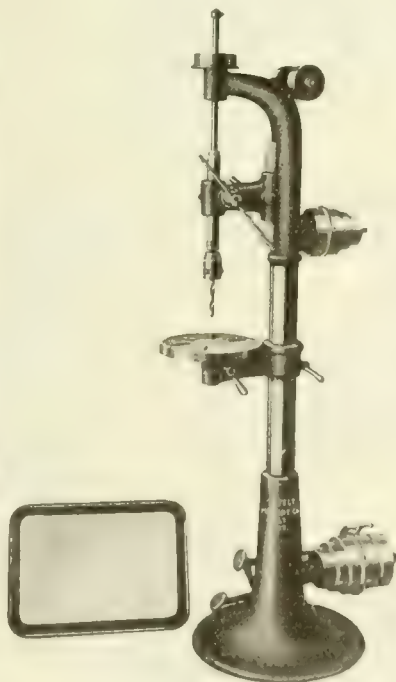
Perfect
12 in. and 14 in.
Screw Cutting
Lathe with Gap

For tool room or machine shop. Capable of delivering the most accurate work at a high rate of speed. A lathe of great power and rigidity. Quick change gear, double back gear, any length you want. You'll be pleased you put this tool in your shop and so will the man who runs it. Our price is right. We have a reputation for accuracy, fine workmanship and finish and our guarantee stands behind every piece of every machine we manufacture.

Furnished in 6' or 8' lengths. Just the lathe for machine shops, experimental shops, technical schools, garages, etc., nice convenient design, small consumption of power, and low price. This tool is in a class by itself. If you want a small lathe, you can't afford to overlook this machine. Ask for catalogue.

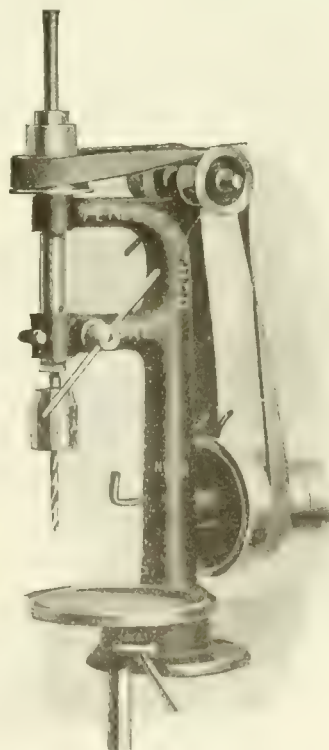


Perfect No. 19 Drill, geared 2 to 1, is driven by a 2-in. belt; has lots of power; handles a drill from 0 to 29/32. You don't realize its value until you compare it with other 18 x 20 in. drills.



NO. 14 PERFECT

A high-class drilling machine, speed 2,000 R.P.M. Drills from 0 to 1/2 in. Looks right—Acts right—Because it's built right.



NO. 18 DRILL

Drills to centre of 10 in. Speed 2,500 R.P.M. Purchase our machines for efficiency, accuracy, durability and ease in handling.

Every machine we manufacture is guaranteed. You take no chances when buying the product of our factory.

Every tool is thoroughly tested by an expert before they leave our plant.

**Perfect
Machine
Co., Limited**

**Galt,
Ontario,
Canada**

*Representatives
in Canada:*

**The Leading
Machinery Dealers
from Coast to Coast**

In Great Britain:

Fry's (London) Limited

The City of St. Catharines

**Manufacturers Locate in St. Catharines
—The Prosperous Industrial City**

Facts about St. Catharines

CHEAP POWER—City owns Hydro-Electric Light and Power System; rates exceptionally low. 60,000 H.P. development of the Dominion Power & Transmission Co., Ltd., two miles south of the city with local distribution system.

TRANSPORTATION—Situated on C.N.R., G.T.R. and Welland Canal. Dominion Express and Canadian Express in operation. Steamer line to Toronto. Electric railway line to Niagara Falls, Welland, Port Colborne, Niagara-on-the-Lake, Port Dalhousie, Merritton and Thorold.

GENERAL—Population, 19,500. City has up-to-date street railway, electric, gas, water and sewage system. Centre of Niagara fruit belt. Industrially the district now includes principally metal industries and pulp and paper mills, several silk, woollen and hair cloth factories, auto tire and rubber footwear industries and numerous industries connected with the fruit products of the district.

The Prosperous Industrial City

SPECIAL INDUCEMENTS—The city is prepared to co-operate with new concerns and offer attractive inducements to all worth-while industrial projects.

Write the secretary of the Board of Trade for full information.

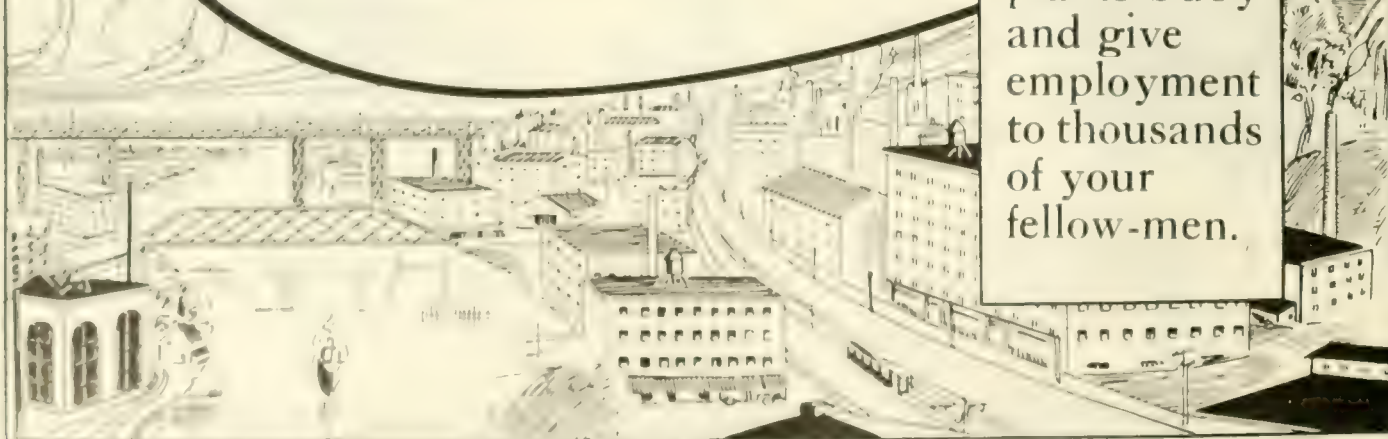
Buy Victory Bonds

All Victory
Bond Money
Stays in
Canada to
Help finance
Canadian
Industry.

Buy all the
Bonds you
can.

Canada
will pay
you 5½%
interest—

and you'll
help to keep
Canadian
plants busy
and give
employment
to thousands
of your
fellow-men.



Six Times as Many Pieces per Grinding

This is the record of

DAVIDSONIZED High Speed Steel Tools

in one of the great Philadelphia plants.

The tools were side mills, 5½-inch diameter by 6½-inch face; the stock, cold rolled steel.

The plant had been experiencing considerable trouble in milling this stock because it had been found impossible to obtain anything but a dragging cut which had made it necessary to follow the milling with a scraping operation.

Upon changing to Davidsonized Tools, not only was the number of pieces per grinding increased six times over, but a fine finishing cut was obtained, of such character as to eliminate the scraping operation.

Davidsonized Steel has long since passed the experimental stage. In the light of the daily experiences of prominent plants throughout the country, no fair-minded man can longer doubt that tools of this fundamentally superior steel will give him faster sustained production, reducing tool costs, labor costs and overhead for every piece produced. Write us to-day.

THE DAVIDSON TOOL MFG. CORPORATION

Main Office: 118-122 Maiden Lane, New York
Works: 6-62 North 6th St., Brooklyn, N.Y.

DETROIT OFFICE PITTSBURGH, CLEVELAND, BUFFALO PHILADELPHIA OFFICE

864 Woodward Ave.,
Alex. Hart, Jr., Mgr.

Knox Andresen Tool Co.,
Exclusive Selling Agents

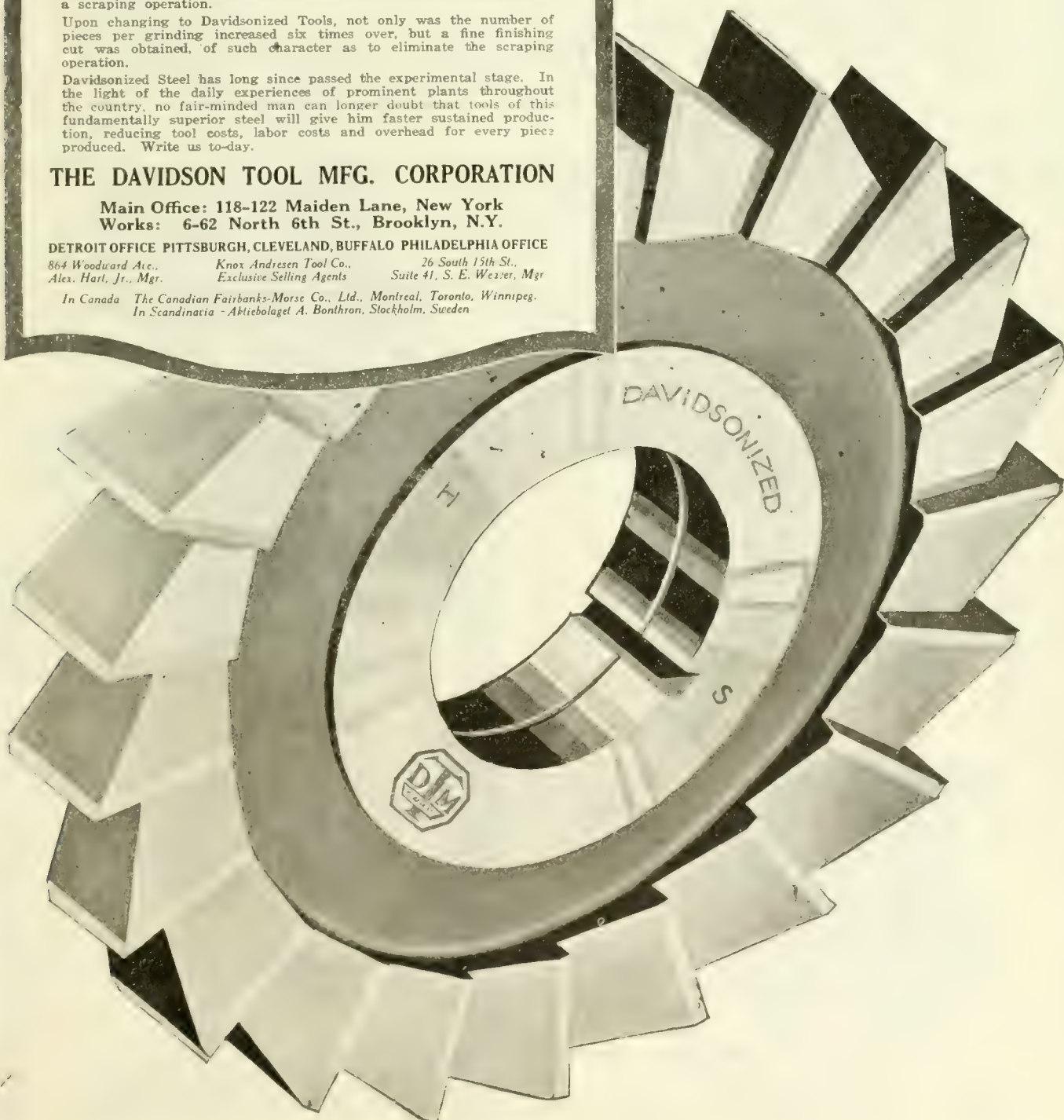
26 South 15th St.,
Suite 41, S. E. Weaver, Mgr

In Canada The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Winnipeg.
In Scandinavia - Aktiebolaget A. Bonthron, Stockholm, Sweden

Special Service

To Concerns Who Make
Their Own Tools

We will supply Davidsonized High Speed Steel Blanks, semi-finished to within approximately .015 to .020, either soft annealed or hardened.



Do It Again

The reaction from war to peace has been sudden and strong. Our courage may be a bit spent, our enthusiasm for service a trifle on the wane.

It needs a little effort and some determination to rekindle the old fire, but it must be kindled if the Victory Loan is to be a success. Canada calls upon you, therefore, for a renewal of your effort. And that can best be expressed if you do your utmost to inspire people to

BUY VICTORY BONDS

P.S.—There is an old saying to the effect that “if you can’t sing the words you can whistle the tune.”

If you haven’t any ready money, borrow some and

BUY VICTORY BONDS

The space donated to the Victory Loan 1919 Campaign by

THE R. McDOUGALL COMPANY, LIMITED, GALT, ONTARIO

The Canadian Fairbanks-Morse Co., Limited Sales Agents

Every Emery Wheel With Its Own Dresser



Desirable, isn't it, now that cost is no objection? For with an inexpensive Desmond-Stephan Dresser for every wheel, every wheel will be touched up frequently and so kept true and equal to its original cutting efficiency.



For all ordinary shop grinding wheels specify “Diamo-Carbo”—the perfect diamond substitute.

For large, coarse, hard wheels ask for the “Desmond-Huntingdon.”

Sherman Corrugated, 2 sizes
Norton Zig-Zag, 2 sizes
Magazine
Diamonds

The Desmond-Stephan complete line of Economical Grinding Wheel Dressers is catalogued. Write for 1919.

The Canadian Desmond-Stephan Mfg. Company
HAMILTON, ONTARIO

A Good Hosiery Limited, Coventry, Agent for Great Britain

P X H

TRADE MARK

Everybody can help to insure continued prosperity and sound business stability by investing to the limit in the 1919

VICTORY LOAN

True patriotism demands it, too.

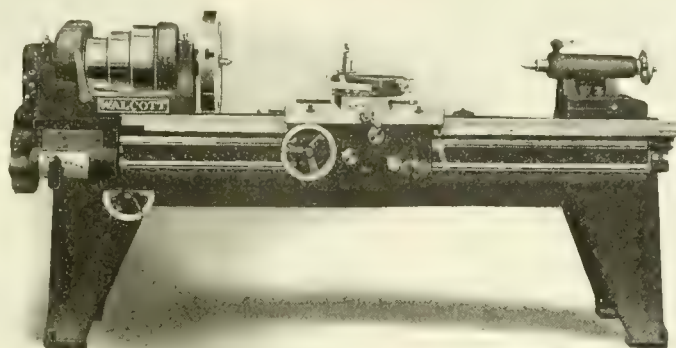
INGERSOLL FILE COMPANY, LIMITED
INGERSOLL, ONTARIO

JOHN MORROW SCREW & NUT COMPANY, LIMITED

INGERSOLL Sole Distributors ONTARIO

IMPERIAL

TRADE MARK



WALCOTT ENGINE LATHE

Three Machine Tools Worth Investigating

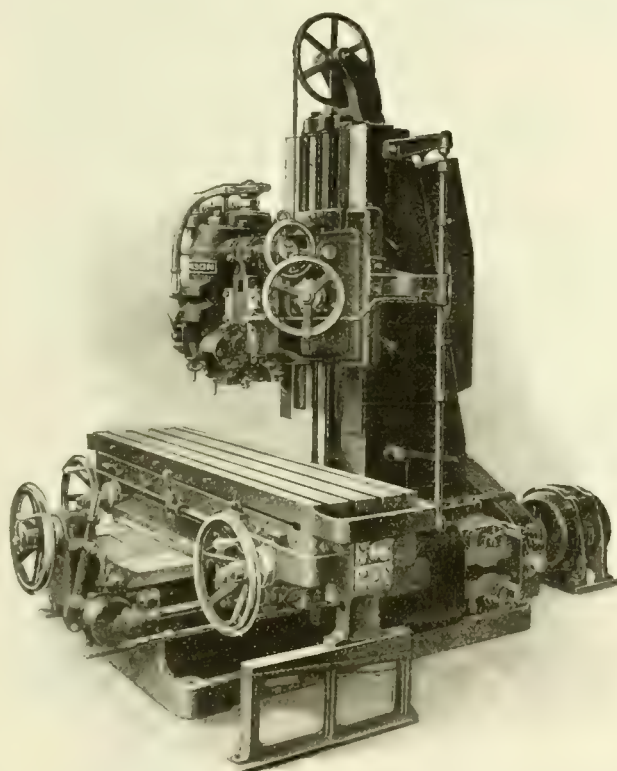
WALCOTT ENGINE LATHES.

WALCOTT CRANK SHAPERS.

JACKSON DUPLEX TYPELESS
DIE SINKERS.

These machines are backed by nearly forty years of machine tool building experience. They are designed in sizes to meet the requirements of your shop, so as to insure the highest production.

Canadian Fairbanks-Morse Company, who have been selling our line of machine tools during the past at Toronto, are so well pleased with their results, they have now taken the agency throughout the Dominion of Canada.



JACKSON DUPLEX TYPELESS DIE SINKERS

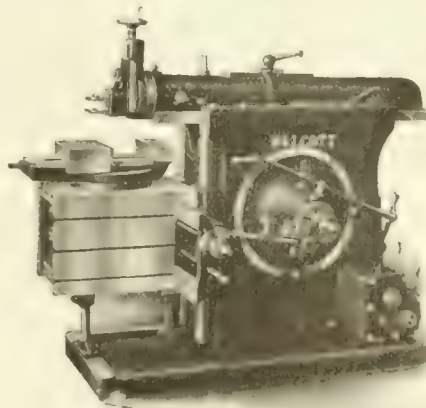
Walcott Lathe Co.

115 Calhoun St. Jackson, Mich.

Est. 1881

THE CANADIAN FAIRBANKS-MORSE CO., LIMITED

Halifax	St. John	Quebec	Montreal	Ottawa
Toronto	Hamilton	Windsor	Winnipeg	
Saskatoon	Calgary	Vancouver	Victoria	



WALCOTT SHAPER

If interested tear out this page and place with letters to be answered.

Notes on Grinding

No. 73A

Grinding Wheel Economy in the Foundry

A thorough knowledge of the physical properties of the metal to be ground is the first essential to the economical use of the grinding wheel in the foundry. The selection of the proper abrasive is entirely dependent upon this knowledge.

For materials of high tensile strength—annealed steel, malleable or wrought iron—the best results will be obtained by using ALUNDUM wheels. On gray cast iron, chilled iron, malleable iron, brasses, bronzes, aluminum and copper CRYSTOLON wheels will be found the most efficient.

The size of the wheel, the amount of material to be removed, and the nature of the material readily determine the size of the grain. Flaking is seldom a consideration; therefore, it is always best to use as coarse a wheel as practical.

The speed of the grinding wheel is of the utmost importance, and must be held within the correct speed range of from 5,000 to 6,000 surface feet per minute, if proper cutting action and economy in wheel consumption are to be obtained.

The life of a grinding machine largely depends upon the care it is given—all bearings must be kept adjusted and in good condition—the spindle must be rigid, and the foundation solid. A grinding wheel that vibrates or jumps is soon rounded to pieces by the shocks and stresses from the action of the castings on the face of the wheel.

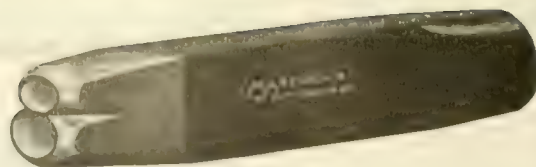
The personal factor should be given careful consideration. No two men will get the same life or efficiency out of a wheel even though the work and conditions are identical—some work the corners hard, others are abusive in applying the casting, or will remove too much abrasive in dressing. All these factors have their effect and often the manufacturer is unjustly blamed for apparent variations in wheel life when the true cause can be attributed to the personal factor.

NORTON COMPANY

General Office, The Norton Company, 100 West 42nd Street, New York, N.Y.
 Canadian Office, 100 West 42nd Street, New York, N.Y.
 Montreal Office, 100 West 42nd Street, New York, N.Y.

Grinding Wheel Plants, Worcester, Mass.

Eastern Branch Plant:	New York Store:	Chicago Store:
Magnum Park, Chicago, Ill.	111 Chambers St.	111 No. Jefferson St.
S. E.	111 Chambers St.	
Detroit Store, 100 W. Congress St.		



Mark Your Products The "Matthews" Way

STEEL LETTERS AND FIGURES

In shops where the highest standards are maintained the stamping equipment is generally "Matthews Made."

Matthews Letters and Figures are hand made from carefully selected steel, heat treated for hardness, insuring long service under hard usage. They make deep, clean-cut impressions that outlast the product.

Mark your next order for steel lettering, dies or stamps—"Matthews Made."

Canadian Fairbanks-Morse Co., Limited

Montreal, Toronto, St. John, Quebec, Ottawa, Hamilton
 Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

Jas. H. Matthews & Co. - Pittsburgh, Pa.
 STEEL LETTERING DIES AND STAMPS

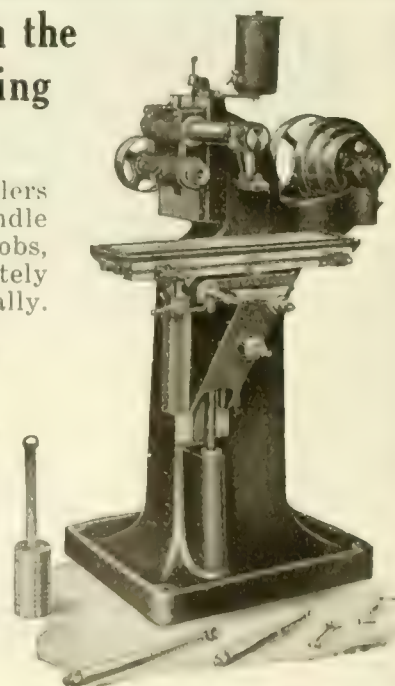
Keeps down the cost of milling Small Parts

These small millers are built to handle small milling jobs, quickly, accurately and economically.

The U.S. Miller so greatly increases output of small parts as to actually reduce milling cost 1/3 to 1/2.

Neither in power nor capacity is any other miller of similar size its equal.

May we send catalog and full specifications?



U.S. MILLER

Manufactured by

United States Machine Tool Company
 Cincinnati, Ohio, U.S.A.

STANDARDIZED LEATHER BELTING



THE GRATON & KNIGHT MFG. CO.
WORCESTER, MASS.

This Book Tells How

Here is a booklet that will help you to obtain actual belting economy in your plant.

It is unusually complete with descriptions, recommendations, rules and tables which will enable you to quickly determine the scientifically correct belt for any given condition.

It explains Standardization as applied to Belting, tells you how to determine the right belt for the right place on the one true economical basis—the work to be done.

Write for it—we'll be glad to send it to you.

The CANADIAN GRATON & KNIGHT CO. LIMITED
MONTREAL, CANADA

Canadian Representatives: The Canadian Fairbanks-Morse Co., Ltd., St. John, Montreal, Ottawa, Toronto, Hamilton, Quebec, Calgary, Saskatoon, Vancouver, Windsor, Winnipeg, Victoria.

Oak Leather Tanners, Makers of Leather Belting and Leather Products

Branches and Distributors in All Principal Cities

COUPON

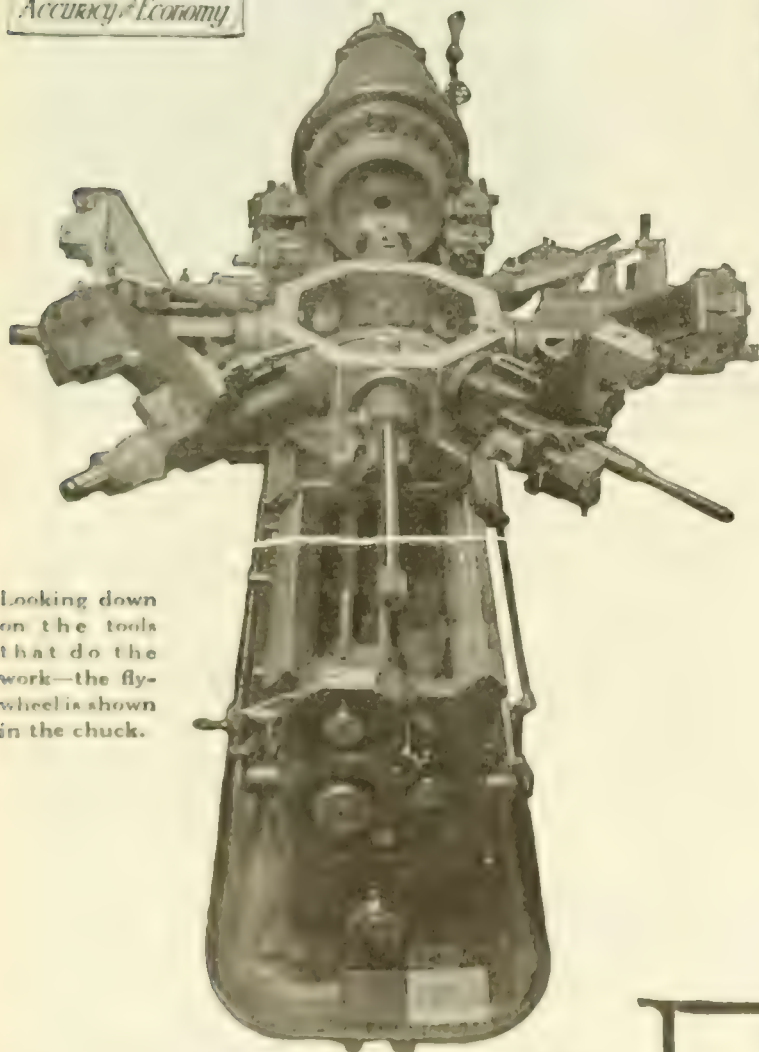
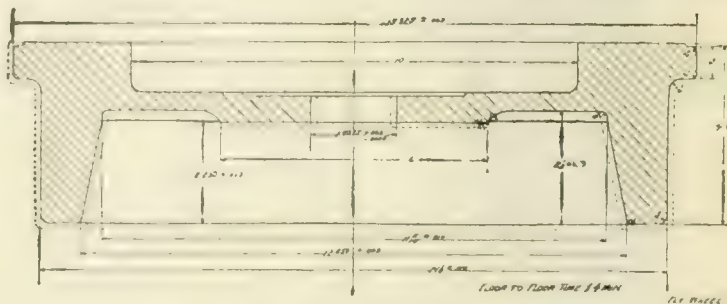
You may send STANDARDIZED LEATHER BELTING Book

To

C. M.

GIS

*Gisholt Methods
Insure
Accuracy & Economy*



Looking down
on the tools
that do the
work—the fly-
wheel is shown
in the chuck.

14 Minutes Each On the Gisholt Automatic

If you have any Automatic Chucking Work, let us tell you how the Gisholt will cut your costs.

Gisholt Automatics show time saving wherever used. They are backed by our years of experience in Turret Lathe production.

GISHOLT MACHINE COMPANY, 1201 EAST

*Builders of Standard and Automatic
Boring Mills, Tool Grinders,*

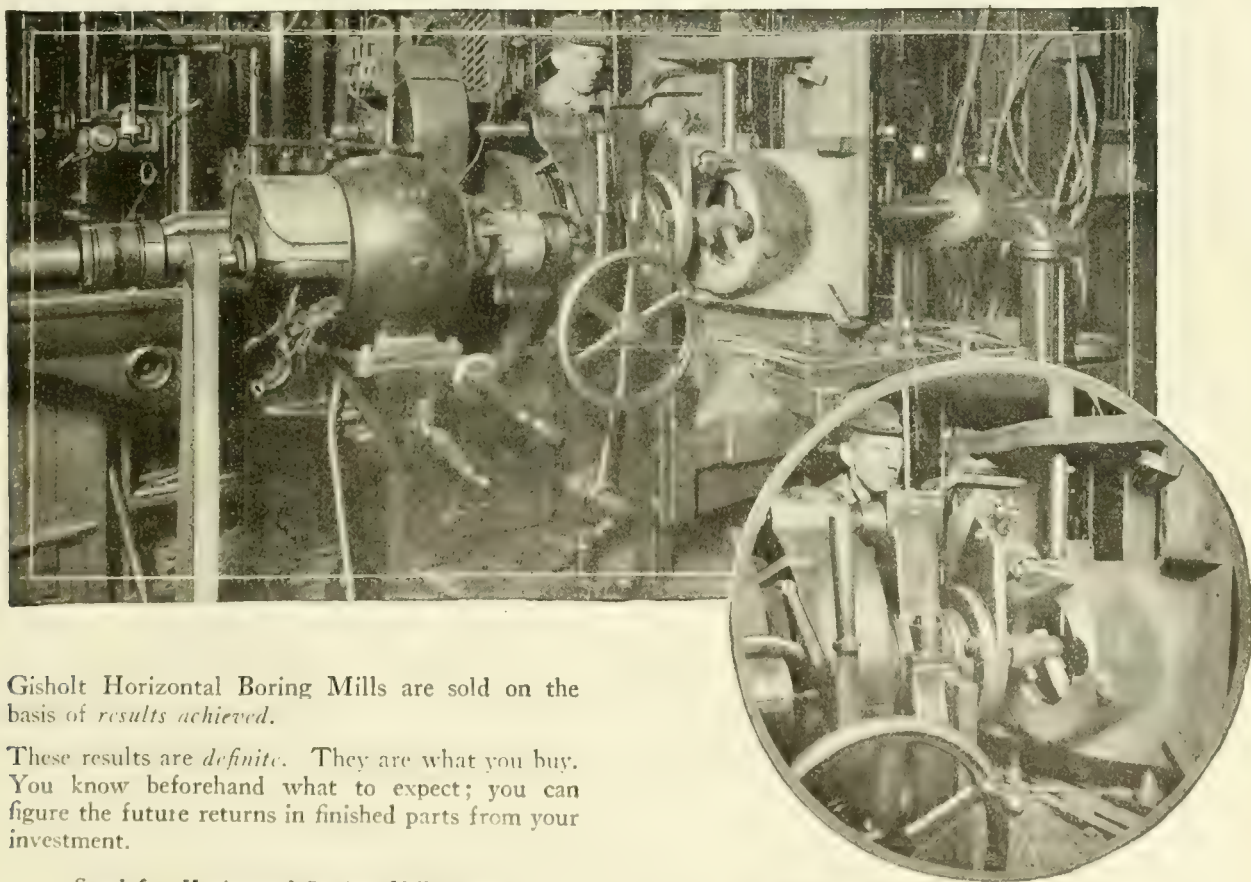
Eastern Sales Office: 30 Church St., New York.

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

If there are any of our products, or any other products, listed under proper heading.



Results Count



Gisholt Horizontal Boring Mills are sold on the basis of *results achieved*.

These results are *definite*. They are what you buy. You know beforehand what to expect; you can figure the future returns in finished parts from your investment.

Send for Horizontal Boring Mill Folder.

*Gisholt Methods
Insure
Accuracy and Economy*

WASHINGTON AVE., MADISON, WIS., U. S. A

Turret Lathes, Vertical and Horizontal
Small Tools, Special Machinery, etc.

Works: Madison, Wis., Warren, Pa.

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Saskatoon, Calgary, Vancouver, Victoria

If interested tear out this page and place with letters to be answered.

An Exchange of Money That Pays—

When you buy Victory Bonds you simply exchange one kind of money for another.

A dollar bill is Canada's promise to pay.

So are Victory Bonds.

But Victory Bonds pay $5\frac{1}{2}\%$ interest.

Consider the security behind Victory Bonds—

Canada and all that is contained therein.

Consider the good rate of interest— $5\frac{1}{2}\%$.

Victory Bonds pay nearly twice as much as Savings Banks.

Consider the saleability of Victory Bonds—

Their use as security for a loan—

Their prospective advancement in price—

Canada must have this money to clean up our obligations to our army and maintain the prosperity of our Country.

These are the best reasons in the world for exchanging one kind of money for another.

Every Canadian should put all his weight behind this Loan.

He should exchange every dollar possible for Victory Bonds—and every dollar he can save for the next ten months.

BUY VICTORY BONDS

Every Dollar of this Loan will be Spent in Canada



The Canadian Fairbanks-Morse Co. Limited

Halifax

St. John
Hamilton

Quebec
Windsor

Calgary

Montreal
Winnipeg

Vancouver

Ottawa
Saskatoon

Victoria

Toronto

CANADIAN MACHINERY

AND MANUFACTURING NEWS

Vol. XXI. No. 18

November 6, 1919

Canada Must Work to Secure Export Trade

In Several Cases Dealers in Foreign Lands State That They Do Not Know Anything About Canadian Lines—Openings for Various Lines if Price is Right

SOME time ago CANADIAN MACHINERY sent a circular letter to a selected list of importers in other countries with a view of securing information for Canadian manufacturers. In order that readers may correctly gather the meaning of the letters used here, we give the list of questions asked in our letter:—

1. Openings for goods that might be supplied by Canadian manufacturers that are not at present being sent from here.

2. Changes in tariff or transportation regulations.

3. Hints regarding the proper packing of goods, and things to be guarded against in the method of packing and shipping.

4. Suggestions in regard to catalogues and advertising matter sent out from Canadian firms. Should these be in languages that are not now sent out? If so, what changes are desirable?

5. What financial arrangements should be made? What system of arranging credits is being successfully followed by the manufacturers of other countries?

6. Are there special designs of machine tools or other articles needed for your trade, or is the standard Canadian line suitable?

Swinnock & Palmer, 18-20 Durham St. W., Auckland, Australia:—"There is an opening here for store trucks. Documents should be posted properly to ensure being here before the goods. British manufacturers are now so handicapped by shortage of timber and other raw materials that it is now impossible to import at a saleable price, and Australian goods are very inferior and also higher in price."

Not Acquainted With Canada

The Toowoomba Foundry Co., Ltd., Box 109, Toowoomba, Queensland:—"Our trade with Canada has been small, which perhaps has been influenced by our experience with the methods of manufacturers and traders in the United States, which has been anything but favorable.

"We only wish to say in respect of your Question 5, about financial arrangements, that the American system seems to be to demand cash with order, as compared with the British system of shipping the goods with charges paid, and making draft at sight or as otherwise arranged with the purchaser. British bankers cater for business along these lines, but American methods seem to be on different lines, in that facilities are not provided for the sale by manufacturers and merchants of their drafts.

"We have had experience even in pre-war times of an American manufacturer taking two years to execute an order, and then being at a loss to know how to obtain

payment, to such an extent that after our waiting for some months for the draft to arrive, we finally remitted from this end, as in the meantime the goods had been in our hands for sometime."

Present Designs Are Suitable

Maynham Tin & Steelware, Ltd., East London, South Africa:—"Opening here for tin plates, steel sheets. Stoves sent to this port are better uncrated. Sheet iron mostly in felt-separated bundles. Very rough handling is given goods here. System of letters of credit ties up for months quite a lot of money. Four to five months' indents have to be paid for in advance, which was never done in pre-war days. As far as we know existing designs of Canadian machines are suitable here."

The Market in Sweden

Aktiebolaget, Rylander & Asplund, Stockholm C.:—

1. The importation to Sweden of Canadian-made machinery is not very large, and never was, but as per our opinion, Canadian goods could get rather a good market over here providing they could compete successfully with goods made in U.S.A., with regard to prices as well as qualities.

2. No changes have occurred to the customs tariff and no special transport regulations with Sweden have to be reckoned with.

3. We feel this question needs not to be specially spoken of, the proper methods of packing machinery being well known to all manufacturers. An important point in this connection is, of course, that machines must be very carefully greased and oiled for the long transportation, especially during the present scarcity of shipping room, causing now and then long storage periods in the export ports.

4. Sufficient stocks of describing and illustrating material is needed to the Swedish importing dealers. Catalogues could gladly be printed in English, this language being sufficiently known to all Swedish engineers and mechanical men of any authority.

5. Providing this question asks for a reply referring to normal, not war, conditions, the reply is that exporters of other countries are generally allowing to the Swedish importers a 3 months' credit, or a cash discount when paying within 30 days. These are the usual terms, which, of course, are subject to slight modifications. Only firms unknown to the foreign sellers, or firms of less capacity, are asked to pay in advance or against shipping documents.

6. We regret to have only little personal knowledge of the standard Canadian machine line, owing to the fact stated above under (1), but we are under the impression

that the Canadian line is following the U.S.A. line with regard to the general designs, and if so, no special changes need to be made to suit the Swedish market.

The right way to get Canadian machines successfully introduced on the Swedish market would no doubt be that the Canadian manufacturers had their interests taken care of by active and capable Swedish dealers on basis of sole agencies. This is the method usually adapted by the leading U.S.A. and British manufacturers, and which have proved, we believe, to give satisfaction to both parties. It no doubt would be worth while that the Canadian manufacturers sent representatives over here to enter connections with the proper Swedish importers; in this connection we wish to mention that many Swedish importers have sent representatives over to U.S.A. as soon as the relieving of war restrictions made such journeys possible, but we are under the impression that only in very rare cases these journeys are extended to Canada, which is due to the fact that the Canadian manufacturers are comparatively unknown over here.

We wish to repeat what we have said above under (1), viz., that the hardest competition for the Canadian manufacturers is that from U.S.A., and if it would mean a hard job to the Canadians to get introduced in Sweden, the job certainly would be worth while.

Care Needed in Packing

George H. Alexander, Coleshill St., Birmingham, England

1. All classes of machine tools and small tools at present supplied by the U.S.A. might be supplied by Canadian manufacturers.

2. Impossible to say what changes are likely to take place in either tariff or transportation.

3. Very important to pack machinery in such a way that the flares, guards and all the light parts of the machine should not be broken in transit. Breakages of parts like this, which are difficult and expensive to replace is one of the troubles that should be guarded against.

It is important to thoroughly grease or protect with anti-rusting material all the bright parts of the machine, and to see that thick oil is well soaked into all the slides and operating parts of the mechanism.

4. For this market, English is all that is necessary, but a good supply of advertising matter, apart from the catalogues, i.e., all the talking points, should be liberally supplied.

5. The present financial arrangements are satisfactory for general purposes, in special cases it is necessary to arrange for extended credit.

Machine Tools Are Wanted

The Meadowbank Manufacturing Co., Works and Head Office, Meadowbank, near Sydney, New South Wales:—In response to your circular, we may express our appreciation generally of CANADIAN MACHINERY, and regret that we cannot help you so much as others on account of our small experience with Canadian goods.

Answering your questions:—

1. There should be good opening for Canadian machine tools. We, ourselves, are looking for:—

A small turret lathe after the style of "Warner-Swasey."

A drilling machine with multiple adjusting head, similar to that advertised—"Whole Hog."

A new type of rolling machine for use in connection with shaping panels for motor bodies, similar to

A machine for rolling mudguards for motor bodies.

A screwing machine for screwing the heads of bolts to barrels and gun.

Various grinding tools, such as ball and nut.

screws, and general hardware are in good demand, also steel.

We are particularly asking for a quantity of pig iron suitable for making malleable castings.

In addition, will you please tell us what Pyrometers are used in Canada in connection with malleable iron foundries?

2. A complete revision of our tariff is contemplated, and you will be able to obtain full particulars in due course.

3. Cargo, if reasonably well packed, reaches us in good condition by steamer. Sailors are to be avoided on account of rust.

4. Catalogues are all right, but price lists should accompany them.

5. Australian buyers generally settle by draft at sight or terms.

6. What suits Canada ought to be quite good for Australia.

Some Chance in Cuba

Ernesto A. Carcas Y Ca., Aguiar No. 110, Habana, Cuba:—We are at the present time endeavoring to get in touch with responsible machine manufacturers for the manufacture of Asbestos-cement, corrugated sheetings, tiles, slates, etc., as are being manufactured in the United States, England, etc. We are interested in purchasing the necessary machinery for the manufacture of these articles, and shall appreciate mightily if you will have the goodness to refer our request to responsible manufacturing firms in those lines, and to take the matter up with us at once.

A Cheap Machine Wanted

James Greaves & Co., P.O. Box No. 406, 11 and 13 Ridgfield, Manchester:—We are in receipt of your circular letter with reference to your Export Number of CANADIAN MACHINERY, and this we are sending out to our correspondents in India for their information. Our lines of business, however, are chiefly confined to textile machinery. We also ship machine tools to India, but they are chiefly the cheaper type of lathes, which are required for grooving the leather rollers of cotton gins. Before the war, we used to buy these lathes in Yorkshire, at about £37 each, including 8 screw bell chuck, 14 in. independent four-jawed dog chuck, index plate, countershaft and 22 change wheels. The lathes have 8 in. centre by 10 ft. gap bed, and include self-acting, sliding, surfacing and screw-cutting motions. If, however, you have a cheap lathe that would fill the above specifications, we shall be pleased to hear from you, although we can quite understand that prices now will be dearer than they were prior to the war.

Charles Booth & Co., Engineers' Tool, Steel and Machinery Warehouse, Booth's Buildings, Park Lane, 38, 40, 42, 46, and 48 Park Lane, Liverpool:—In reply to your circular letter, we consider that there is a large outlet for cheap machetes and shall be glad if you can put any makers in touch with us. They are a very cheap article, but are used in very great quantities.

Interested in Machine Tools

T. Eilbeck & Son, 2-8 John St., West Perth, Western Australia:—At the present time with the exception of a little agricultural machinery and Ford Cars, we know of very little Canadian manufactures imported to this State.

We find that most American goods are well packed and shipped, and presume that the Canadian manufactures would be packed in a similar style.

As we have not been in touch with any Canadian firms except through London buyers, we can pass no remarks about their catalogues. It is certain that your journal reaches most firms here, and is well known, and the advertisements in such a journal reach the source for which they are intended.

Most of our business has been done with English and American firms. We have usually paid cash against sight draft this end. In the case of firms whom we represent, goods are forwarded on consignment to us payable within twelve months from the time of delivery. We think most probably this is the same system as adopted by your manufacturers.

Machine tools are a line in which we are very interested. We find that the American and Canadian lathes, for instance, are not adapted to our market. Most of the engineering shops handle all classes of work, and the straight bed lathe is not suitable, and very few are sold compared with the gap bed. The same remarks apply to a number of their tools, which in the American markets are made for repetition work, and are not suitable here, because we have not the population to give that repetition work which would require the use of such tools. All machine tools used with a few exceptions are for general all-round work, and have to be selected accordingly. We find that there is more demand for the English type of machine than for the American of this kind.

General. We are ourselves manufacturers of wire nails and other such lines, and cannot remember having been approached by a direct representative of one of the Canadian steel firms, whose agents in most cases are in the Eastern States of Australia. As we are over 2,000 miles away from the Eastern State, naturally we are practically isolated, and have to get in direct touch with the manufacturers, thus we usually buy through London. We would be pleased to answer any questions within our capacity regarding this market.

About the South African Market

Especially prepared by MR. W. J. EGAN, Canadian Trade Commissioner to South Africa.

Documents—It is essential that one copy of invoice and non-negotiable BILL OF LADING should reach customers in South Africa on or before the arrival of the carrying steamer. Selling to arrive, is a big factor in South African trading. Overseas customers should be advised as far ahead of actual shipment as possible, of the consignments coming forward. Other countries shipping to South Africa follow the above practices and as trade will always follow the line of least resistance Canadian shippers must conform or lose the trade in hand.

Invoices—On all invoices with C. I. F. quotations invoice must state the amount of the ocean freight. The face of invoice declaring true value at the time of shipment should correspond with the declaration on the back of invoice.

Insurance—Place all your overseas customers' INSURANCE with companies represented at destination; when this is not done, claims are delayed in settlement from nine to fifteen months. There are other difficulties, but the one quoted is enough to bring home the reasonableness of the demand.

Drafts—South African merchants want their drafts through their own BANKS. Many importers have stated that so little attention has been paid by Canadian shippers to their instructions that for the future they will stipulate on all order forms, that they reserve to themselves the rights of refusing acceptance of goods unless their instructions re DRAFTS are followed.

Shipping—Remember that shipping "overseas" is not the same as "inland." The packing must be strong and yet not cumbersome. Do not leave batten space which eats into delivery costs.

When you use iron hooping on cases see that it is a hooping and not a baby ribbon. Every case, crate, barrel, bale or single bar of iron should be marked in such a way that the name of the port of destination is always in evidence.

Heavy bales should be strapped and not tied with string or light rope for overseas shipping.

The test of your success in export can be judged by the repeat orders.

Make your first three or four shipments so perfect that it only requires representation to hold and increase future business.

If your shipping methods are such that your representative is always fighting a battle to excuse your errors, what is the result? You will lose your representation as well as your business and the good representative is not easy picking.

You should by personal visits and inspection, see to it that the shipping department is living up to its job.

Keep the shipping department impressed with the fact that shipping 8,000 miles overseas is not the same proposition as say, from Hamilton to Toronto.

Remember always that comparatively the initial order is easy to take, it is the SHIPPING METHODS that count. Make your shipping department so thoroughly efficient that your overseas client will always remember what a smooth job it is to cost and pass the Customs entries on your goods. When he thinks of the line you manufacture it is the name of your firm that is before him, although he may have on file fifty other manufacturers of your article. Department of Trade and Commerce,

Ottawa, July 19th, 1919.

DRAWING COURSE PRIZE ANNOUNCEMENT

OWING to the poor class of work sent to us on plates Nos. 1 and 2, we cannot, to do justice to these plates, award the usual three prizes. Two prizes, however, are awarded to plate No. 1, and one to plate No. 2. The names of the lucky ones are shown below.

On plate No. 3 every scholar fought shy of this plate, although lettering is of such importance, so no awards can be given for this section.

Plates for Nos. 4 and 5 are still coming in nicely and we are glad to say that the class of work is steadily improving.

Our advice is this—stick to it, send in your work—and secure a prize.

We have definite word to the effect that considerable numbers are following this course, yet they seem to refrain from sending in their work. Once more let us repeat: We wish to see the result and will, if necessary, suggest where improvement can be made.

Following are the prize winners: Plate 1—Earl Forrest, 182 Albany Ave., Toronto, Ont.; G. Arundel Lamb, 36 Homewood Ave., Kitchener, Ont.

Plate No. 2—George W. Hibbard, 45 Riverside Drive, Cottage No. 3, Lachine, Que.

Canadian Machinery As An Advertising Medium

By J. H. M.

THERE is a saying that no matter where we go we will meet with a doubting Thomas, and, of course, the same holds good as far as advertising is concerned.

"You've got to show me," is a favorite expression of these Missouri inhabitants, so following is proof of the most convincing character. To commence with, the writer is not connected with the advertising staff, but merely one of the editorial department. He was not in search of a glowing tale regarding the possibilities of advertising, but he was out to find how business in general was going.

The gentleman whom he interviewed was S. L. Clark, Esq., of the Perfect Machine Tool Company, Galt, Ontario.

"How's business?" was my first question, and the reply was as follows: "Splendid. We are doubling our foundry capacity and intend doubling our machine shop space directly after."

Naturally, such a reply was encouraging.

"How do you account for this rush and where is the work coming from?" was my next query.

"To your first question I would say that this is the result of producing a first-class article and advertising the same judiciously and wisely; secondly, that our orders are coming in from all over the Dominion of Canada and Great Britain," was his reply.

"Evidently you are a firm believer in advertising," I said.

"I certainly am," was the reply. "Here are my views on the subject:

"In advertising, just the same as in anything else, good judgment must be used. You must study where to advertise, when to advertise and how to advertise. Each feature is equally important. You can spend more money foolishly through advertising than in any other way. In some cases I would not give five cents for space which they ask \$10.00, \$20.00 or \$30.00 for, simply because I believe that no results would be obtained. In other words, I pick carefully where I advertise. I am a firm believer in the possibilities of export business and have secured inquiries from England, France, Spain and South America through judicious advertising in CANADIAN MACHINERY. We have made good connections already in England and hope soon to make connections of like nature in the other countries mentioned. The man who advertises is bound to go ahead, providing that the article he is advertising backs up every statement in his advertisement and he uses judgment in what he puts before the buying public.

"Personally, I cannot speak too strongly for the cause of advertising, and I firmly believe that CANADIAN MACHINERY, as an advertising medium, has helped us considerably in our present business expansion."

Accidents Have Taken a Back Seat in This Plant

Power Presses Are Generally Conceded to be Dangerous Machines to Operate, But the Various Safety Devices Herein Described and Illustrated Have Made the Press Operators' Work Perfectly Safe

By J. H. MOORE, Associate Editor Canadian Machinery

SOME twelve to fourteen years ago, the writer was engaged in the pleasant (?) occupation of pushing various three-wheeled trucks filled with tin cans across the floor of a certain can-making factory. While making these daily journeys it used to be a common sight to see some press operator suddenly give a yell and jump up off his stool, but not before he was minus a finger, or perhaps a goodly portion of his hand.

One got hardened in time to these sights, which were, as a general rule, of daily occurrence. Even the operators themselves seemed to realize that they were engaged in a hazardous task, and simply made the best of it.

No one ever thought of properly safeguarding these presses. The danger was ever present, yet still it remained with no real serious attempt to minimize it or to eliminate its existence.

Certain half-hearted attempts were made to place some sort of protection in front of the punch, but no serious thought was given to the problem, with the result that the trouble went on as usual, in spite of the fact that accident reports showed that more injuries occurred on power presses than on any other type of machine, with perhaps the exception of the circular saw, which was a close rival for injury toll.

But time works many changes, and now it is the writer's privilege to tell another story of a can-making industry. This time an entirely different tale. Where his first little reminiscence told of lack of safety devices, his second tale is one fairly pounding the words **Safety First** home to his readers.

It is good to know that there do exist firms so interested in their employees' welfare, that they make a careful and special study of the safeguard problem, and the following article concerning the plant of the American Can Co., Ltd., proves conclusively that not only has this firm spent considerable time and money in safety devices, but that the workers in turn appreciate what the firm is doing for them.

To enter an article of this nature is somewhat difficult, for it is not our intention to confine this story to the press room alone, but rather make it general in character, describing the various safety devices throughout the entire plant.

Many of these devices, or appliances, were impossible to photograph to advantage owing to their location, etc., but a written description of the ideas as adopted will suffice for the purpose of explanation.

Regarding the power press problem. We have secured photographs of several press guards in actual operation in or-

der to clearly bring before the reader's eye, how the devices appeared on the press. All data procurable have also been added to the title of each photograph, and in the reading matter following.

It is our hope that readers will obtain benefit from this article and find some of the guards referred to applicable to their own industrial line.

In such case the time spent in studying the material given will be time well spent.

artificial), throughout the entire works. This is a matter which unfortunately does not always receive the careful consideration it deserves.

The Woodworking Dept.

Inspection of the woodworking department was next made, and here the safety guards were first in evidence. Every saw was properly protected with an efficient guard, so that the operator could not injure himself without actually removing the guard. All belts, gears,

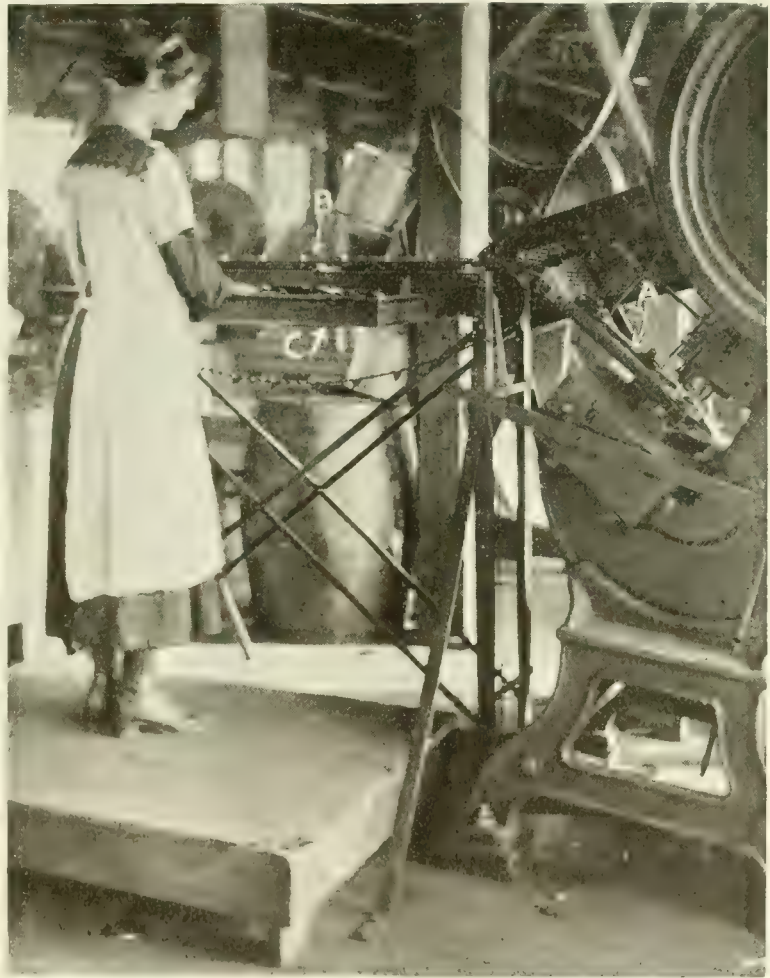


FIG. 1 A CHAIN CARRIER SAFETY DEVICE.

The company we speak of operate sixty different plants, and maintain at their headquarters in New York a safety department regularly organized with a manager and the necessary under organization, whose time is devoted entirely to the furthering of the safety idea, and the general welfare of the employers.

On commencing the tour of the plant the first important point which came to the writer's notice was that of the splendid lighting system (both daylight and

pulleys, etc., which were in any position at all likely to prove dangerous, were properly protected by suitable guards, but of these we will say more later on.

A walk through the entire plant was made, the writer noting down what he believed would interest not only one class of readers of **CANADIAN MACHINERY**, but all classes, so he will merely set down his impressions one by one, leaving the reader to study from his own angle as how best to adapt the



FIG. 2 THE GENERAL APPEARANCE OF THE DISKED FLY-WHEELS ON PRESSES.

various ideas to his own particular conditions.

The Fire Zone System

This firm has adopted a splendid system of fire drill. Every portion of the plant is divided into certain zones, each worker within that zone being thoroughly instructed what they must do in case of fire. Each zone has a certain exit to which the workers in it must go, this feature preventing panic and overcrowding at any one exit. Blue prints showing the layout of plant, with zone areas, exits, etc., all plainly marked, are placed throughout the factory, so that workers can have no excuse for not remembering the instructions given them.

The Elevators

Another safeguard system is that adopted on the various elevators throughout the plant. Each elevator is operated by a carefully trained workman, and all doors at each floor automatically close as the elevator leaves the floor. On each elevator there is a card on which is plainly marked the elevator's capacity, above which it must not be loaded.

Various Type of Guards

Passing through the various departments, one cannot help but notice the multiplicity of guards. They take the form of belt, gear, pulley, rheostat and

motor guards. Wherever there is a belt in a precarious position it is suitably guarded by means of a wire mesh guard on an iron framework, or by a cast iron guard if the conditions warrant such a procedure.

Overhead belts especially, are watched carefully, for while these could not very well do any damage so long as they run correctly, they might cause considerable trouble by breaking and coming down on the head of the passer-by.

Gears, pulleys, etc., on all machines are, wherever possible, guarded with wire mesh or tin guards, also in some cases with guards of grey iron. Wall rheostats and motors, either on platform or floor, are all suitably guarded with wire mesh, and iron framework. In other words, in all corners of this plant the safety first idea holds sway.

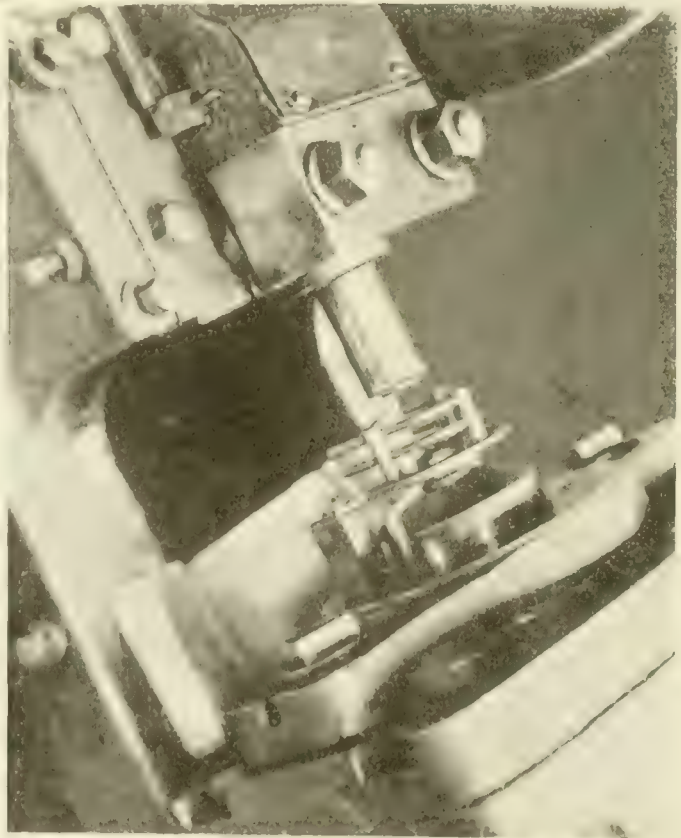


FIG. 3 A SIMPLE AND EFFECTIVE CAGE GUARD.

First Aid Room

There is a splendid first aid room situated on the ground floor, with a trained nurse in attendance. The room is modernly equipped in every respect to handle accidents, (but, if one may be allowed to make a comment), the nurse is not overworked since the installation of these various safety devices.

Paper Can Section

In addition to the regular tin cans, etc., which this firm manufacture, they turn out a complete line of paper cans of all sizes. The same feature of belt guards, etc., is carried out in this department, but no guards are necessary on the presses, as these are automatic



FIG. 4 A PRESS WITH CAGE GUARD.



FIG. 5 A PRESS DEVICE ADOPTING A WHITE AS THE SAFEGUARD.

in action, the operator never being near the punches while in operation.

The Press Room

Last, but not least, let us consider the press room. As we enter this room the orderly appearance of the presses strikes the eye. These presses are arranged in three main rows, with plenty of aisle space between. At the back of each press is arranged a suitable chute to catch the finished work. In addition to these chutes, plans are under way to instal suitable belt conveyors to carry the work to other presses for further operations. This belt conveyer system is already adopted in the paper can station.

A big safety feature in the press room is the fact that all press fly-wheels are disked, as can be noticed on one of the accompanying photos. The same plan of covering the spokes of the wheels is carried out throughout the entire plant. The advantage of such a scheme needs no comment for its value is self apparent. The workman cannot get his clothing caught on such a wheel as has often happened with the spoke variety.

Portable floor cranes are provided to help the workman place his dies on the press, and speaking of dies brings us up to the method this firm has of storing their dies not in actual use.

Suitable shelves are built up and divided off to accommodate the dies. Cards plainly marked with all particulars are fastened at the various shelves, so that the workman knows at once where to go for a die, and what it is for. We cannot here refrain from remarking that we have seen plants where this idea could be carried out to good advantage.

At the side of each press, is either a suitable tray on which is placed the work for the operator, or a wheeled truck if such a tray is not practical. The trays mentioned can be seen in



FIG. 2 A NOVEL SAFETY SCHEME, WHERE THE TABLE COMES OUT FROM UNDER THE PUNCH, FOR LOADING PURPOSES.

several of the photographs illustrating this article.

A part of the equipment on each press is a air hose which always has sufficient air pressure on it to blow away dust or small portions of tin which would have a tendency to stick on the die.

Should a larger portion stick to the punch or die, a skillet is provided on each press to knock away such obstructions.

This skillet, which is a large tapered piece of hard wood, is fastened to the side of press by means of a chain. The chain can be seen on several of the photographs. Of course, there is no possibility of losing the skillet when it is fastened in such a manner. Above all, the operators are warned not to place their hands under the punch.

On the ram of each press is fastened a set of safety rules, one of which covers the above-mentioned point. These



FIG. 10 IT IS ALMOST IMPOSSIBLE TO GET HURT WITH THIS MACHINE.



FIG. 11 A VERY EFFECTIVE TIN STOCK CUTTER GUARD

rules are so important that we present them in panel form.

Brief Description of Devices

Following we give a brief description of each of these devices, also below every paragraph we mention the vital parts in its design.

In Fig. 1 we illustrate what the workers have nicknamed "The Flying Dutchman," and what we would call about as perfect a safety device as could be wished for.

It will be seen that the operator is quite a distance away from the press, which is continuous in its action, therefore in no danger. The automatic chute feed A, is merely a guide slide which sends down one piece at a time. The operation being performed is that of a bumping operation, the work being the tops of the well-known Dutch cleanser tin.

The tops are placed on the travelling chain B, out of the tray C, and a continuous feed is kept up. The die embosses, rolls the edge and bumps the perforations on this can top, all in one stroke of the press.

This installation has not only safeguarded the operator, but has increased production to a considerable extent.

At Fig. 2 we give readers a good idea of how the whole finished appears to the eye. As we have already mentioned the advantages of this system, we will go on to Fig. 3, which illustrates a very simple but effective cage guard used on a press punching milk can plugs.

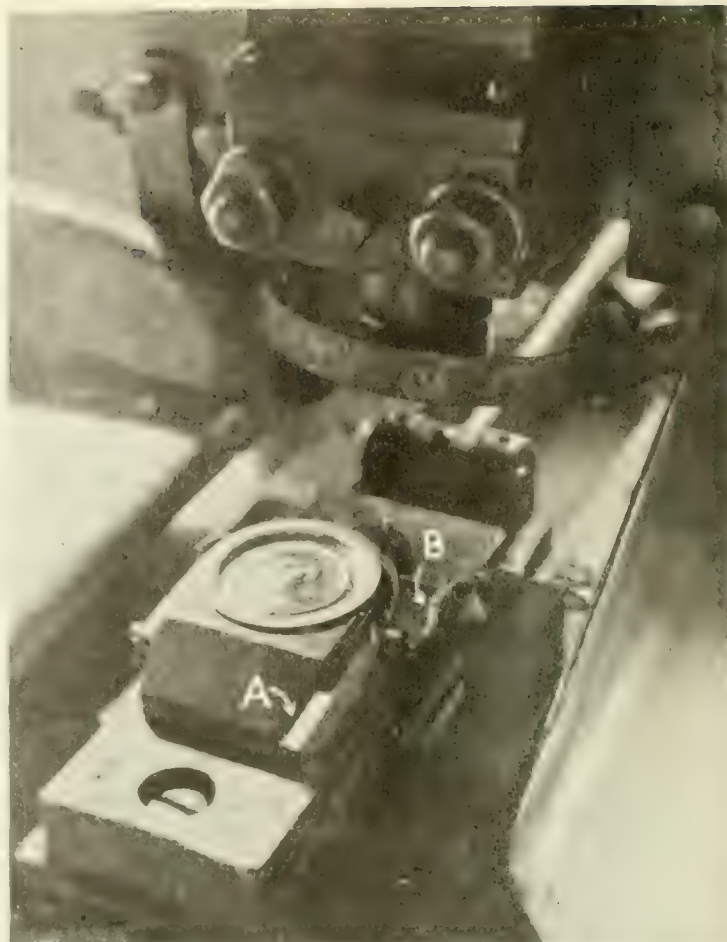


FIG. 7 A CLOSE UP VIEW OF THE STRIPPING MECHANISM DESCRIBED IN ARTICLE, RELATIVE TO THIS DEVICE.



FIG. 2 THE FLYING DUTCHMAN WITH CHUTE FEED SLIDE

It is impossible to get your hand under the guard, and, of course, there is no need for you to stick your hand over it. The stock used is single width, and feeds in sidewise, as usual. The operator is never in danger, as the guard is so close to the die that it is impossible for anything thicker than the stock to pass through. 40,000 of these plugs have been turned out every nine hours since the installation of this guard.

Figs. 4 and 5 illustrate two more efficient safeguards. The former is simply a wire cage which completely surrounds the die, the work being slid down a small chute on to the die. In this operation, which is the punching of milk can plugs, two punchings are made at one time, the die being of double design. These punchings are made entirely from recovery stock, (i.e.) stock which has been recovered or salvaged from former operations. Considerable saving is thus effected.

Fig. 5 illustrates the chute principle in a more distinct form, the operation being the bumping and flattening of Crisco can tops. Production has increased since this guard has been placed on the press, and, of course, the operation is now free from danger. The operator's hand placing the tops in place in chute is clearly seen.

At Fig. 6 is shown what the workers call the "Go away—come back" press.

In a way this is not a bad name for it, for that is exactly what it does. The table A, on which the work goes, moves in under the punch immediately the treadle is depressed. Down comes the punch and performs the operation and out comes the table A, once more for the operator to remove the finished product, and to replace another piece in perfect safety. The action of this table is controlled directly through an arm from the crank shaft, with suitable lever and spring. A cam on the crank shaft pushes this table in and out, as the ram of press descends and ascends.

Before this method was adopted, six to seven thousand was the maximum production of can tops, with considerable danger attached to the operation, but at present nine thousand can be turned out in similar time with perfect safety.

Readers will also notice the guard B, which has a transparent front, in order to allow the operator to see clearly the action of the punch.

At Fig. 7 we show another installation of the "Go way—come back" motion, with yet another added feature. Readers will note the small lever A, with small spring B, behind it. Immediately the operation is performed the work table returns as usual, but in this case this lever kicks, or trips, ejecting the work automatically and throwing it into a chute which carries it into the waiting truck. By this method, the operator need only concern herself with the loading process, as the unloading or stripping of work takes care of itself.

We now come to Fig. 8, which illustrates an automatic feed slide A. It will be seen that the operator is so far removed from the punch as to be in no danger. To make sure that no punchings stick in the die, a swinging apron, B, is also installed as part of the die. This apron is made in two halves, swinging from stud C, as a fulcrum, and a similar stud on the other side of the die. The operation being performed is what is known as a friction plug. Briefly, the action is as follows: The ram descends, the apron B opens, being opened by the pin D, which goes through a hole in the apron. A similar pin on the other side opens other half of the apron. The portion E trips the lever F, and feeds down the work at the proper time. The operation being performed, the ram, with punch, ascends, the apron closing automatically, the punching drops on the apron and slides into the chute G, and from there into the receiving box or truck.

The previous production before this safeguard was installed was 2,500 per hour, but 3,000 per hour is now turned out with the operator's safety assured.

We call the readers' special attention to Fig. 9, as here is shown the latest safeguard of all. This guard, A, is used in conjunction with what is known as a 5-step gauge, B.

A study of its action will be time well

SAFETY RULES

1. Do not operate this machine until you have been shown how to run it.
2. Do not operate any machine in this factory until ordered to do so.
3. Never place your fingers under a punch or knife, or between dies or rolls of any machine.
4. Use a stick or hook to remove pieces of work, dirt, etc., from dies or any other part of machine. If no stick or hook is handy ask the foreman for one.
5. If machine gets out of order stop it and tell foreman. Do not start it again until it has been fixed.
6. Never clean machine while it is running.
7. These rules are for your safety, and must be obeyed.

(Signed) AMERICAN CAN CO.

NOTE. A set of these rules is printed on a tin panel and fastened to the ram of every press in the plant.

spent. The stock is first of all cut off in five widths, that is, sufficient stock for five rows of punchings. Readers will, by looking at this photo, notice four different gauge points, C, D, E, and F.

These handle quickly four different positions of the stock. The fifth position, which, in reality is the second row of punchings made, is controlled by the finger gauge G, which is operated by the heel of the operator's hand on the lever H. On the other row of punchings being made it is necessary that this finger gauge be lifted out of the way. This is accomplished by means of the pin J, supported from the bracket K. Every stroke of the ram the spring clip M comes down on this pin J and trips finger-gauge G, lifting it sufficiently

to allow the stock to pass through. The action of depressing the lever H allows the finger-gauge to remain in place to gauge the stock on the second row of punchings. Readers will, of course, easily grasp the construction of the guard A, as it is merely a well-constructed cage with a plate glass front to enable operator to watch closely the operation.

Fig. 10 illustrates an altogether different type of machine, but a safeguard of splendid design. The operation to be performed is that of trimming and heading the bottoms of shoe blacking boxes. The work is fed into the chute A, the wheel B allowing but one piece to go through at a time. The operation itself is performed down towards the bottom of this photograph, so that the operator

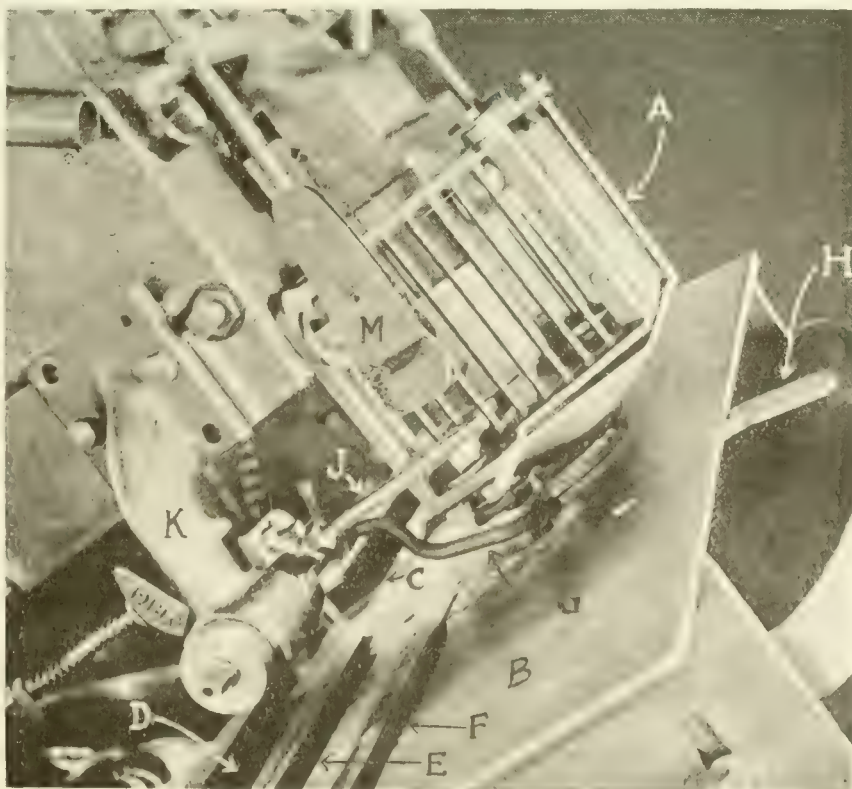


FIG. 9 A NEW DEVICE, COMBINING SAFETY AND EFFICIENCY, KNOWN AS A FIVE-STEP GAUGE.

is never near the scene of action, therefore in no danger.

Last but not least, we come to a very simple gauge (shown at Fig. 11) and yet one which has prevented many an accident. The operation is cutting the wide stock tin to various widths.

The wheels A, B, etc., accomplish this operation. Formerly it was a common slip, and, although not actually taking off his hand, these wheels or cutters used to give him a nasty wound.

But now conditions are different, with practically no added expense to speak of. A simple cast iron guard C is fastened on to the bed of the machine as shown, and the operator cannot possibly get his hand near these cutters except he deliberately takes his hand off the stock and throws it over on to the revolving wheels. Of course when a man does this sort of thing he needs a doctor in more ways than one.

Having studied the various safe-

guards, let us see what conclusion we can arrive at. For instance: Does it pay to instal safety devices, both from the employers' point of view and from the employees' standpoint? We would say Yes with a capital Y, for not only is the employee protected, but the employer gets added production, with the knowledge also that he is, as far as humanly possible, looking to the welfare of his workers.

"Has it paid the firm referred to to instal these devices?" might be another question we could ask.

Again we say yes emphatically, for although this firm has appropriated over \$188,000 (throughout all their plants) on safety devices of all kinds, they consider it money well spent.

Against a record of numerous accidents of all kinds, the firm have only two accidents to tell of this year, each of which could easily have been avoided with a little care on the part of the operators.

It will be noted throughout this article that production figures on all operations show an increase instead of a decrease, as some people would have you believe always happens when a safety device is installed. Such an impression is erroneous in every respect, for it stands to reason that the worker feeling perfectly safe can enter into her work with more speed and zest than before.

As the great percentage of press operators in this plant are girls, still greater credit is due to the management, in that they have reduced accidents to a minimum. In conclusion, we can only express the hope that readers will find at least one idea in the present article which they can adopt in their own line of business.

Above all, boost the safety movement. Remember the three rules of safety: First, look; second, look again, and third, look once more. If you do this you will never regret it.

Making Steel in Canada

The Open Hearth and Bessemer Processes Are Described in This the Last Portion of the Series. The Acid Open Hearth and the Basic Open Hearth Processes Are Discussed in Detail



In the early days of the iron and steel industry the product of the blast furnace known as pig iron, was converted by means of a puddling furnace into wrought iron. The furnace in which this conversion took place is shown in Fig. 1. In most cases it was built of brick, although some structures were made of iron.

The iron made in these furnaces was made as the result of very severe physical action on the part of the workman. The quality of the material depended upon the workman's skill and judgment. The furnace had to be so constructed that the iron could be heated to the point of fusion until it reached a temperature of about 2,500 degrees Fahrenheit, and then by means of a ladle it could be poured into a casting bed. The casting bed was built of refractory material, weighing about one hundred pounds each. The

balls were removed and taken either to a hammer, or a set of rolls, and worked into bars. They were known as puddle bars, and formed the basis of all other rolled and forged materials. The theory at the back of the puddling furnace is a little hard to understand, but the impurities were removed by oxidation, and the working of the material in the furnace exposed all portions to the action of the flame, and resulted in a material tough and fibrous. The drawback, of course, was that only small quantities could be made at a time, and that a dependable analysis was hard to obtain.

This product, as mentioned before, was known as iron. Steel was made by taking selected pieces of iron, packing them in a crucible along with certain materials high in carbon, and bringing the whole to a soaking heat for a certain period. This produced a material that could be used for the pur-

pose of making cutting tools, knives, etc.

After the discovery in year 1856, by Sir Henry Bessemer, that steel could be made in larger quantities, definitions have changed, and steel can now be defined as "Purified pig iron, which has been cast while in a molten state, and in which the carbon and other impurities present in the original pig iron have been reduced to such a point that the ingot cast is capable of being forged, or rolled into blooms, slabs, billets or bars."

To-day we have four (4) main branches of the iron family:

Cast iron, which contains anything from two and one half (2½) to three and one half (3½) per cent. carbon, and is the product of the blast furnace without any refining, except remelting.

Steel which has been defined

above, and for usual commercial purposes, such as structural steel bars, etc., has a carbon content of from .20 to .50 per cent. carbon.

Steel castings, or cast steel, which is a material very much the same as the steel mentioned above, except that it is cast into a mould, and intricate and massive shapes obtained, which cannot be manufactured by rolling.

Tool steel and alloys steel made by melting either in an electric or a crucible furnace, selected portions of bar steel with special chemical ingredients to obtain an extremely hard material capable of cutting and working other steels.

All the above are known as ferrous materials, *ferrous* being the Latin name for iron, and they are thus distinguished from the non-ferrous materials having copper, etc., as a base.

We have already mentioned Sir Henry Bessemer, who in year 1856 made known what was then called the method of making steel without fuel. The apparatus he used is that known as the Bessemer convertor. Roughly, the process consists of placing a quantity of molten iron in a vessel; air is then introduced at the bottom and blown through the bath of metal. The rapid combustion that ensues eliminates carbon and other impurities, and the working of the bath secures a thoroughly mixed material.

The shape of the vessel is very peculiar. It is suspended by trunnions between two high "A" frames, the air entering through one of the trunnions and being carried down to the wind box at the bottom. The wind box contains the bottom section in which are a number of small holes, $\frac{3}{8}$ to $\frac{5}{8}$ inch. in diameter, through which the air is forced into the molten metal. The bottom portion is made removable and special facilities are usually provided to enable bottoms to be changed without loss of time; their average life is from twelve

to twenty operations, or blows, as they are termed. The other trunnion is used for attaching the necessary gearing for rotating the vessel, and the peculiar shape of the nose-piece is to enable the molten metal to be poured in when the vessel is laying in a horizontal position. The vessel is lined with firebrick, laid

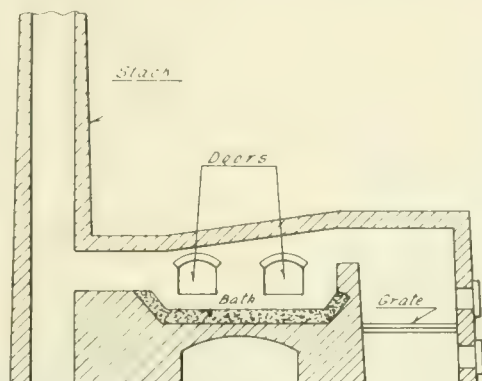


FIG. 1—PUDDLING FURNACE.

with great care, a lining may last from six hundred to one thousand blows.

The actual time to blow a charge of metal is about twenty minutes, but charging and pouring consume, perhaps, another thirty minutes, so that one blow per hour is all that can be counted on. Modern convertors usually have a capacity of from fifteen to twenty tons.

The metal is brought from the blast furnace in the hot metal ladle. The ladle is lifted up and the contents either poured direct, or by means of runners into the convertor, the blast is then turned on and the vessel turned to the vertical position. After blowing, the vessel is again rotated and the contents are poured into other ladles, and from this thence into ingot moulds. The blast is supplied by a blowing engine, or turbine, and has a pressure of from twenty to twenty-five pounds per square inch.

This invention of Sir Henry Bessemer

marked an epoch in the history of steel making, for by it large quantities of steel could be produced at a time, but owing to the rapidity of the process the analysis of the material was not completely under control. It is quite true that practically all the carbon could be removed, and carbon in one form or another added in certain weights to give the desired results, but the other ingredients, such as manganese, silica, sulphur and phosphorus were not under complete control, and Bessemer steel lacked the uniformity that afterwards came to be desired, so a process known as "The Open Hearth Process" was perfected by Sir William Siemens about the year 1861. Fig. 2 shows a cross-section of an open hearth furnace, and before proceeding further we should become acquainted with the particular parts:

Furnace Proper. Note the heavy steel binding, and the manner in which the furnace can be rotated in order to pour the metal, and skim off the slag.

The Port Ends. The lower opening is for the gas, and the upper opening for the air. Combustion, of course, does not take place until the two intermingle in the furnace.

The Checkers. A mass of brickwork arranged with openings somewhat similar to the checker-work in a blast furnace stove. One checker is for heating the gas, and the other for heating the air.

The Stack, which provides the draft for pulling the gas through the furnace.

The Gas Inlet Valve.

The Air Inlet Valve.

Now, follow a complete cycle of operations, the gas and air come in through their respective valves, which are so set as to enable them to pass along the flues, through the checkers, up through the ports and into the furnace; they mingle and ignite, pass over the bath of metal in the furnace, out through the ports on the opposite end of furnace, down through the checkers,

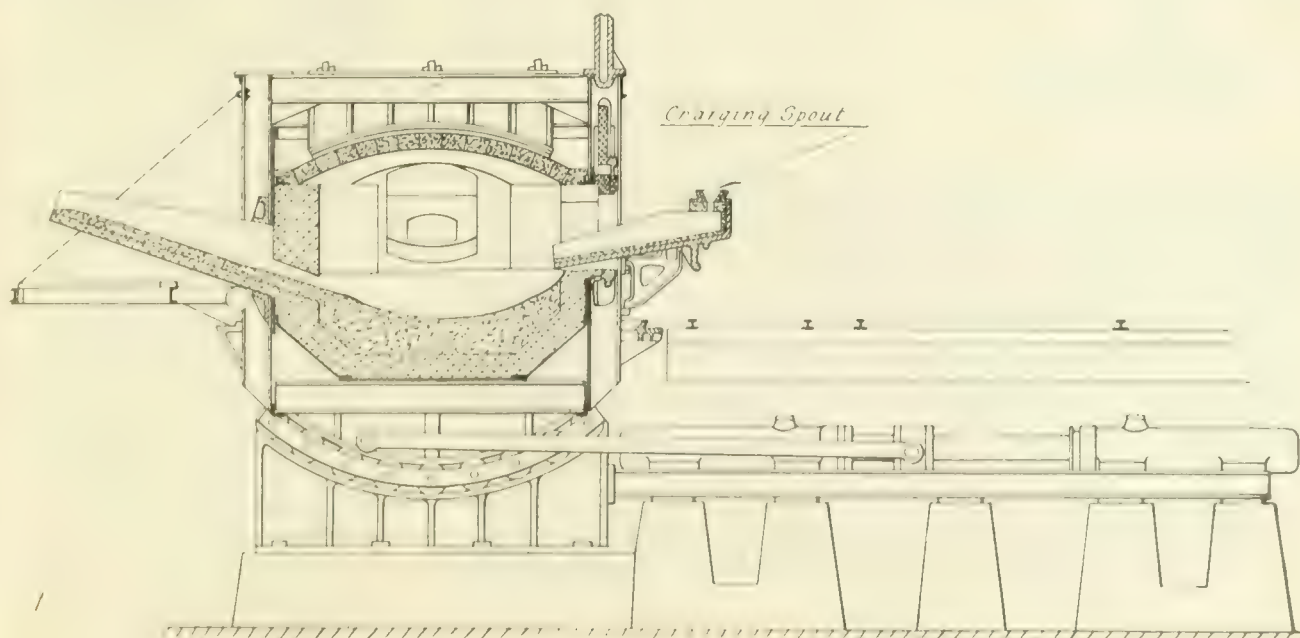


FIG. 2—CROSS SECTION OF 25-TON FURNACE.

giving up their heat as they pass to the brickwork, through suitable openings in the gas and air ducts into the flues and out of the stack. After operating in this manner for, say, twenty minutes, the valves are reversed and the gas and air take exactly the opposite path. When a furnace gets properly into operation, the air is pre-heated to a temperature of about one thousand degrees by the heated end of the checkers. This process of obtaining heat from the waste gases is known as the regenerative process.

Not all furnaces are made of the tilting type. Many are stationary, and have a tap hole opened very much the same as a blast furnace. The brickwork forming the end of the ports is contained in a cage and made removable, so if the end of, what might be termed, the blow pipe becomes burned away, it can be replaced without stopping operations for a lengthy period.

Steel made by this process is, of course, known as open hearth steel, and the usual period to refine a charge of metal is from ten to twelve hours. At any time samples may be taken and analyzed, so that the metal is under complete control of the melter. Capacity of the furnaces varies from fifteen to one hundred tons.

There are two distinct open hearth processes: the acid open hearth process and the basic open hearth process. The furnaces, port ends, checkers, etc., are the same for both processes, except for a difference in the material forming the furnace bottom lining.

The different processes are to suit one of varying qualities. Let us review the impurities in the raw materials:

- 1.—Carbon—which settles the class and hardness of the steel.
- 2.—Silicon—desirable in correct proportions.
- 3.—Manganese—desirable in correct proportions.
- 4.—Sulphur—produces red shortness.
- 5.—Phosphorus—produces cold shortness.

The acid process takes care of low phosphorus and sulphur ores, while the basic process takes care of high phosphorus and high sulphur ores.

The Acid Process

The acid process aims at reducing to allowable limits the following impurities in the steel:

- 1.—Carbon.
- 2.—Silicon.
- 3.—Manganese.

The sulphur and phosphorus is not

eliminated, so the total furnace charge must not contain more of these constituents than is desired in the finished heat.

The process is one of oxidation, or burning, the carbon in the steel is oxidized to carbon monoxide, which further changes to carbon dioxide and passes off as a gas. The silicon and manganese are oxidized and form the slag that floats on top of the bath of metal and protects it.

The Basic Process

The basic process aims at reducing to allowable limits:

- 1.—Carbon.
- 2.—Silicon.
- 3.—Manganese.
- 4.—Sulphur.
- 5.—Phosphorus.

The first three items are removed in the manner described in the acid process, while the sulphur and phosphorus are removed by the addition of lime, which forms a slag to absorb them.

The charge of a furnace consists of hot metal, scrap and lime. The metal is poured in by means of a charging spout. The lime and scrap are charged by means of a charging machine, Fig. 3. This machine picks up a steel box full of scrap or lime, takes it to one of the furnace doors, pushes the box into the furnace, turns it over, dumping the contents and then withdraws.

When the heat is ready, samples having been taken and quick analysis made to determine the pouring, the ladle is placed before the furnace, the melter takes his position and with a signal orders the huge furnace to be slowly rotated, the silver stream of liquid steel breaks away from the bath, rushes along the pouring spout and plunges into the ladle.

The analysis of the metal is known, and the melter also knows what class of steel is desired, swift calculation is made and carbon in the shape of powdered coke, or coal added to correct; also manganese in various forms.

The ladle fills, the slag overflows and is caught in a pit or another ladle, then the crane hoists the 75 or 90-ton load and places the ladle over the waiting row of metal moulds, the opening at the bottom is opened and the steel flows out and fills the moulds.

The moulds are all on cars, and after cooling are taken to the stripping crane, where the mould is lifted off and the ingot is then ready for the mills. See Fig. IV.

Before passing on there are one or two details deserving attention. The reversing valve, Fig. V, notice how the direction of the gas is reversed and the path of the waste gases altered by the one movement.

The pouring nozzle in the ladle, Fig. VII, which enables the metal to be poured from the bottom of ladle into the moulds.

In some plants the metal from the blast furnaces is taken first to a mixer,

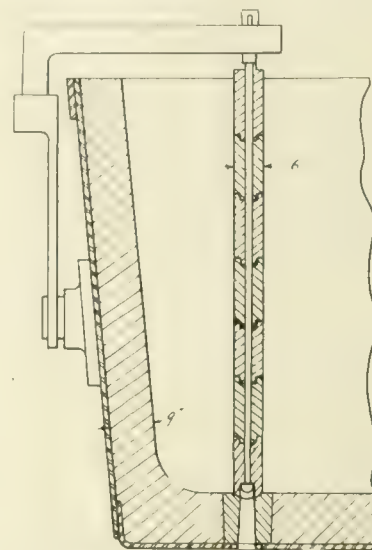


FIG. 7—SECTION OF A PRODUCER.

which acts as a reservoir and secures uniformity of product.

The usual fuel for open hearth furnaces is producer gas, made from bituminous coal, but coke oven gas and tar are sometimes used.

The gas producer is an apparatus for producing combustible gas by the incomplete combustion of solid fuel.

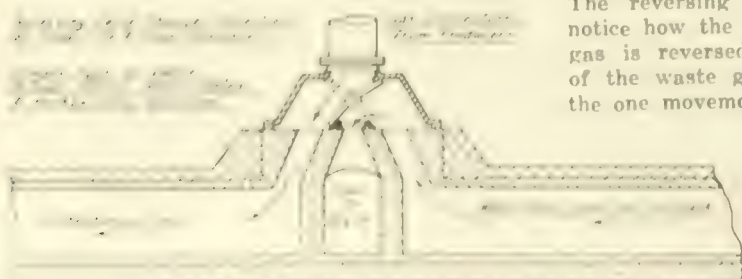
Fig. VIII shows a section of a producer manufactured by the Morgan Construction Company. The operation of making gas is as follows:

When the producer is in operation, the layer of ashes extend to a height of about three feet above the ash-pan, or to such a point that the top layer of ashes is kept opposite the sight-holes in the producer shell. The central blast tuyere is, therefore, surrounded by ash and protected from the heat.

A horizontal layer of incandescent coal from 2 ft. to 3 ft. thick commences at the level of the sight-holes. At this point the red-hot carbon, coming in contact with air and steam which have been superheated by passing through the glowing ashes, seizes the oxygen from both and is transformed into carbonic acid (CO_2), at the same time liberating the hydrogen from the steam. The carbonic acid passing upward seizes another atom of carbon from the hot fuel, forming carbonic oxide (or carbon monoxide CO), while part of the hydrogen from the steam will also unite with the glowing carbon, forming marsh gas (CH_4) or other hydrocarbons. In the upper layers of the coal a somewhat lower temperature prevails, but even at the surface of the fuel the heat is sufficient to liberate the rich volatile gases which are found in varying percentages in all bituminous coals.

To melt a ton of steel takes about

Continued on Page 84



How One Galt Concern is Forging Ahead

Herein is Described the Plant of the Elliott & Whitehall Co. This Concern, Though Only Established Two Years, is Handling in Splendid Shape Some Very Important Work

By J. H. M.

IF you were to select say ten parties and ask them how long, in their opinion, a concern should be in existence to become established, the answers would be without doubt varied. This question of existence and establishment carries a greater problem than appears on the surface, for conditions, not only of trade, but of location, labor, etc., enter into the matter very strongly.

We do not intend this article to be an attempt to prove that two years' exist-

equipment, they are building at the present time a special saw grinder from which they expect good results. This is the firm's own scheme and will aid greatly in their production.

The heat treating portion of the plant is well looked after, three units built by the Standard Fuel Engineering Co. of Detroit being used, a carbon steel furnace, a high speed furnace and oil tempering furnace being installed. The oil quenching bath is enclosed in a

worth the telling, for at the present time everyone is talking Victory Loan and Victory bonds.

This firm was the first concern in their city to be awarded the Prince of Wales emblem for obtaining 100 per cent. in this new loan campaign. In addition to this honor, seven crowns have been awarded them for exceeding the allotment in the amount of the subscriptions. The flag is now proudly floating over their plant. Pep, vim, and enthusiasm make such conditions possible.

One thing more and we are through for the present. Every employee is a reader of **CANADIAN MACHINERY**. We mention this with justifiable pride, for while we would not go as far as to state that we are, by our paper, helping them along, still it shows that their success is due to initiative together with employing of men of ambitious nature, who are anxious to keep up to date, and therefore read **CANADIAN MACHINERY**.

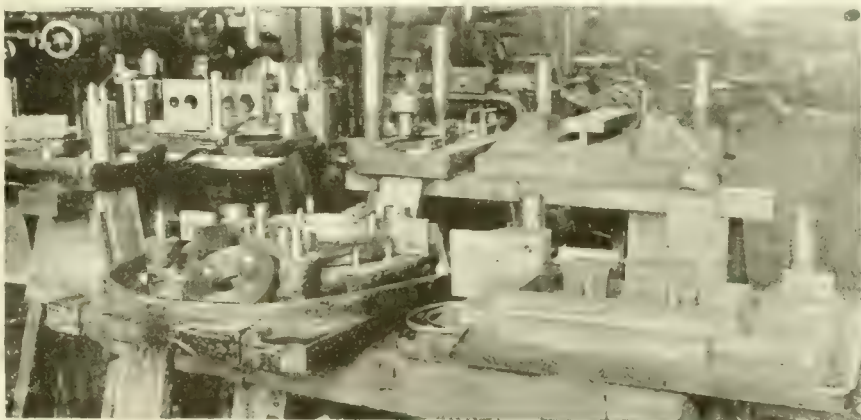


FIG. 1 GENERAL VIEW OF VARIOUS DIES MADE AT THIS PLANT.

ence means establishment, but we do wish to place on record that here is a firm only a few years of age, so to speak, and yet very well established and running night and day.

To reach this result in such a short space of time, needed perseverance, ingenuity and hard work, coupled with a firm belief that success would come in due course of time, but these are characteristics that both members of this firm possess.

Their plant is filled with all the latest type of machines, such as Cisco Tool Room Lathes, LeBlonds, Turret Lathes, LeBlond Universal Milling Machines, McKenzie Shapers, Oakley Grinders, Rivet Internal Grinders, and a variety of special machines for the tool room department, etc., and owing to the daily repeated orders from the largest manufacturers in Canada, this young concern will soon be branching out into larger quarters to make it possible to keep their promises on deliveries on their work.

The class of work tackled by them is varied to say the least, for while their regular line is milling cutters and small tools, they also handle special machinery such as jigs and fixtures, metal stamping dies, etc.

The photos throughout this article illustrate some of their machines in actual operation and in addition to the regular

water cooling arrangement which ensures fresh water at all times, keeping the oil at proper temperature. Work of all kinds including carbonizing is easily done with these heat treating units.

If you look at Fig. 1, you will see various types of dies, etc., made by this firm. No attempt has been made to show any particular die, but rather to show a general view of the different kinds, and Fig. 2 shows a portion of the plant operating these dies.

While the next portion of our story may not be strictly mechanical, yet it's

Car Company Reorganization.—Reorganization of the National Steel Car Company will be considered at a meeting of the shareholders to be held shortly. A circular has been issued showing accounts payable of \$3,487,740, and accounts receivable and inventory, \$1,884,556, leaving a deficit of \$1,603,184. The company has adjustments under negotiation with the P. L. M. Railway in France, which would result on the company receiving \$450,000, and its real estate, plant and machinery are valued at \$2,600,000. The reorganization proposed calls for a new company, 19,000 shares of the stock of which would go to the shareholders of the National Steel Car Co., the latter also receiving the proceeds of the French settlement.



FIG. 2 GENERAL VIEW OF THE MACHINE SHOP.

Solving the Problem of Why is a Hot Box

Excerpts From a Paper Read Before the Canadian Railway Club, of Montreal, at Their September Meeting, on the Subject Above Mentioned. The Discussion of Same is Also Reported

"Why Is a Hot Box?"

Mr. President and Members. The query offered you in this little paper strongly reminds us that a person of inferior intellect may advance a proposition that a sage may find difficult of solution. In other words, a fool may ask a question a wise man cannot answer. If you will accept the part of wisdom and look for the answer, I will bear the onus of the simple, but inquiring mind.

The expression "Hot Box" is the one generally used to describe that condition which results from the journal of a car truck becoming heated.

This heating of the journal has a wide effect. It first sets fire to the waste and oil in the journal box, then it warms up the temper of the brakemen, this is transmitted to the conductor, and from him to the engineer. The next to hear of it is the dispatcher and he becomes hot. Then the trainmaster comes in on the game and he heats up the superintendent and the car department. If there is sufficient fire it gets up to the president at times and great is the "Passing of the Buck" all along the line.

The only one vitally interested who keeps cool seems to be the car knocker, who puts in the new brass and dope, which costs the railway anywhere from 5 to 8 dollars. He seems to be a fatalist and regards the matter as an act of God, against which it would be futile for him to rage, or get hot.

I used the expression "Passing of the Buck" in this connection, and as I am afraid some of you may not know what I mean by that, I will explain that it is merely that regular routine of our daily life wherein you attempt to get from under, and put it on the other fellow, regardless of the merits of the case.

In dealing with hot boxes, the "Buck" is a lively animal, as he has a wide field to cover, but one thing we do know and that is that we are further away from a solution of the problem today than we were 25 years ago.

Some young men of a serious turn of mind will no doubt resent me treating this matter in a semi-humorous manner. Well, you see we get that habit of late years. The boys at the front, you know, went out after the Hun with a joke, but he knew how deadly the thing was just the same. We at home joke about the last coat of dough and other serious things, while we wear our year before last underwear and get that old suit turned around side out for twelve dollars because we can't pay twenty dollars for a new suit, and pay for a bond at the same time.

I really am not disposed to treat the

hot box in a light manner. It is far too important for that. It means huge sums of money and danger to life and limb of the railroad man and the traveling public. Nor am I disposed to give that lively animal the "Buck" any more exercise than I can help in dealing with this matter.

There is no effect without a cause, and behind everything is a fundamental principle. The cause in the case of the hot box is 99 per cent. neglect—the effect is bad.

The first thought in the minds of some of you is to jump up and protest that word neglect, but wait awhile and see how it turns out. In dealing with hot boxes you will find the "Buck" turn up under many aliases—a few of them are: Bad oil, bad waste, bad brass, rough journal, rough truck, truck out of square, overload, etc. Each and every one of these spells "neglect" by someone.

A car truck mechanically correct requires very little lubrication to keep it running with cool journals. By mechanically correct we mean that the truck has been properly constructed to do the work it was intended it should do. The journals on which it rides are of a size to carry the load they will be called on to carry, the saddle, or wedge, of proper shape and the journal bearing of a quality of metal that will reduce friction to a minimum.

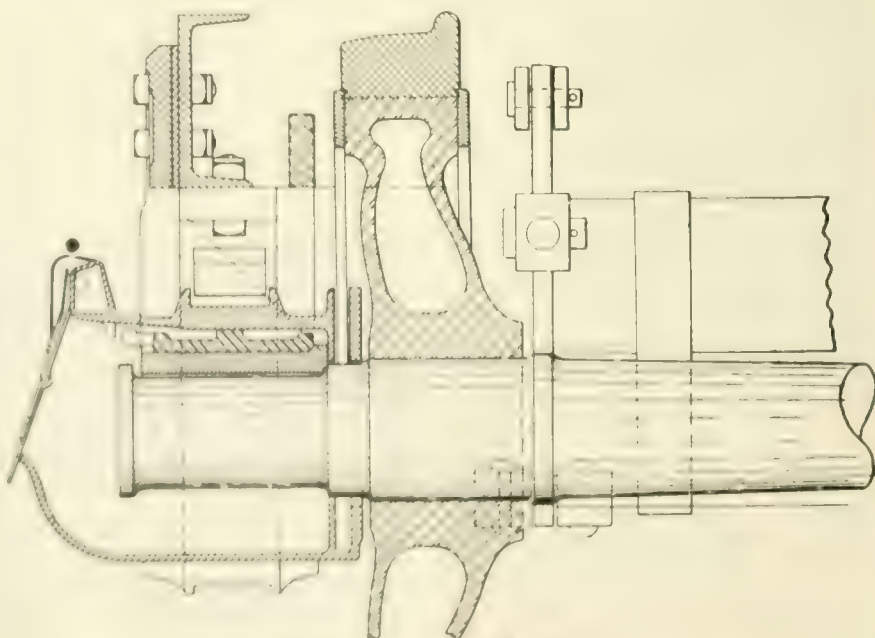
If we start out with such a condition, and maintain it, the question of lubrication is so simple that it is practically non-existent, or it would be if the con-

ditions surrounding the working of a car truck were not so diversified.

Now let us glance at a concrete example. We will take a train load of grain from the West, or the lake ports. The cars are, when loaded, in fair condition, not perfect, but fair. Some of them have new journals and wheels, some of them have old. Some new brasses and some part worn. This train starts out with a locomotive that leaves it at the end of 125 miles. The locomotive is carefully looked over by the engineer and then placed in round house where other men look it over and do any repairs necessary, and it starts out on its next 125 mile run in pretty good order. At least it has had a good deal of attention paid to it.

What about the cars? They are run onto a siding and two car men start down the line to inspect the boxes. How do they do it? They pull off the box cover, glance at the end of the packing in sight, see that there is no smoke, close the lid and go on. The engineer when going around his engine, places his hand on the big end, the little end, the slide bars and many other parts to note how cool or warm they may be. He knows they are not hot, but he wants to know if they are thinking of becoming hot. Does the car man do this? He does not, and the cars start out on another 125 mile run. How many hot journals are there at the end of that run? We don't know, maybe one or six. These receive attention of a kind at this stop, and on they go again.

Before they reach the end of the next



SECTIONAL VIEW OF BOX

run some of those that were hot have had several brasses applied to them with more or less success. Some of them are in bad shape and must be stopped for new wheels, the journals have been cut, and some that did not give trouble at the first or second stop are giving trouble now, and so it goes on to the end of the run. Now, if these journals had all been tested with the hand at the first stop and those showing an inclination to heat given a little attention, and the same thing done as often as the engineer tested his engine, do you believe there would have been so many hot boxes on that train?

Did any of you gentlemen ever use a horse and buggy and suddenly find one of the wheels sliding and jump out and grab the nut with your fingers, and let it go again quick, because it was hot, and after it had cooled off and you removed the wheel you found plenty of oil on the journals, with the exception of a spot about half an inch wide? I have, and it made me realize that it is not necessary for a journal to be all dry to make it run hot. It is the back end of the car journal that needs attention, but how seldom it gets it until too late.

Do you agree that the hot boxes on the train we have tried to describe were due to neglect, and was that a fair skeleton description of the average train? Well, then was not it neglect to give the necessary attention that was the cause of 99 per cent. of the hot boxes. Why this neglect? Here is one reason, the railroads haul freight at so low a figure that they feel they cannot afford to have the number of men necessary to give the cars the proper attention. What you can't do yourself you must trust in Providence for, and Providence does not look after box cars.

Just here I wish to say that, in my humble opinion the men who design our cars and the men who maintain them come very near performing a miracle in keeping the number of hot boxes so low, considering the adverse conditions under which these cars must operate.

There are many other phases of this question apart from the above, and there is one that is most difficult to deal with. This is the car left at a way station or siding in winter time until the dope is completely frozen, but the car is thrown onto a train and must get along as best it can. However, the better attention at divisional points hinted at above would help greatly in these cases. We cannot, I believe, totally eliminate the hot box on freight cars, but we can reduce the number 75 per cent. by spending the money to do it.

The foregoing few words will, I hope, introduce the subject of hot boxes on freight cars, but we still have the question of the same trouble on our passenger equipment.

Some time ago I had the pleasure of looking into this matter and after taking the statements of trainmen, trainmasters, superintendents, car men and others into account, and also watching

the "Passing of the Buck" along the line, I came to the conclusion that here again we come down to that word neglect.

In a Canadian winter our cars do have a hard time of it. Shoved into a yard with snow and ice scraping the journal boxes, with the inside heated to 100 degrees and the outside frozen solid, they cannot be in good condition to give satisfactory service. The only answer to that problem is to have the cars placed in a building as engines are placed in round houses. Such a building should be heated to about sixty degrees and no heat applied to inside of cars. Two hours after cars are placed in such a building all snow and ice falls away from trucks and running gear, leaving the car clean for proper inspection. The dope remains in the best possible condition, and the car goes out for its run in as good shape as we can make it. I have seen cars handled in this way, and I know that the results were good.

Many people will say that it is impossible to house all of our passenger equipment, or not actually impossible, but that the cost would be prohibitive. I fully appreciate the fact that the cost would be great, that is the initial cost, but it is a question if it would not be quite as wise an investment as the round house. It would not be necessary to place every passenger car, mail car and baggage car inside of a building. Many of the spare cars could be left outside as now, but I believe that we should have buildings to accommodate all cars on our regular trains with room for a reasonable number of spare cars that should be available in case of accidents.

The cost of such buildings would be considerable, but against this cost, what would we save? I believe that this building could be heated with less fuel than is now used for keeping the interior of cars warm while standing out of doors, and that the number of hot boxes could be greatly reduced, or practically eliminated. It is hard to tell just what a hot box would cost, but we know that they cost considerable money. I also have statements from car men to the effect that in one year they have expended sufficient money in re-piping cars that have been frozen to pay for a building to protect them. This may be exaggerating, but if the saving in this direction in five years would pay for the building, I believe it would be a good investment.

There is another phase of this question that in my opinion has not received the attention that it deserves, and that is the extent to which we are using, by wear, our journal bearings. I have made several tests of this, and have found that the quantity of brass actually used up by wear is very small indeed. We are practically running on white metal. This does not apply to any particular road, but to many roads, as I have reports from different places on the continent all bearing out what I have said.

Now, what is the trouble here? I think we can all remember when journal bearings were very much more worn in service than they are to-day. I can remember journal bearings that had never given trouble and were finally removed because they were worn so thin that there was fear of them breaking or being worn clean through, allowing the journal to come in contact with the wedge. Such a condition, so far as I know, is practically unknown to-day. It may be stated that in the days when journal bearings were so worn that our cars and loads were lighter, and this is true, but in those days our journal and journal bearings were smaller. In other words, they were designed to carry the loads of that day. The journals and journal bearings in use to-day are supposed to be designed to carry the loads of to-day. They are not doing it in a satisfactory manner. Is this another case of neglect, that is, have we neglected to provide journals and bearings large enough to carry the loads?

I believe that these matters are of vital importance and they deserve all of the attention we can give them, and that any man who has an idea on the subject should feel at liberty to advance that idea. He may be wrong, as I may be in some of my ideas, but by advancing his proposition or idea he may bring out a better one, and that is what we want.

This little paper has been purposely made short. The idea being that it would merely introduce this very important subject, and I have endeavored to interest not only transportation and mechanical people, but also members of the Engineering Department, and have these people present to take part in the discussion. There are many angles to this matter, and one of these is the engineering angle, which I have not touched on at all.

In conclusion, I want to say this, this club has been in existence a good many years, that it has done some good I know, but I honestly believe that if the club will take up this question of hot boxes, and follow it through, and have their work result in the elimination of 75 per cent. of the hot box trouble of this country, it will have done a greater work than anything that it has done in its previous history.

Chairman:

Gentlemen, I think you will all agree with me that this is a very interesting paper and should bring out a lot of discussion. I would like to hear from any gentleman pertaining to this valuable paper.

In a discussion that invariably follows the reading of paper of this description there are generally many reminiscences mentioned that have no direct bearing on the subject, these incidents being cited to relieve the tension that might otherwise develop if the members confined their remarks exclusively to the points in question. Our readers will therefore bear with us if we omit such portions of the discussion

as might be considered of minor import, dealing only with the essential factors that treat on the subject of "Hot Boxes." While the discussion at this meeting was almost entirely one of interest to railroad men, the principle of the arguments could be readily applied to all classes of engine or machine bearings.

In opening the discussion, W. H. Rosevear, of the Independent Pneumatic Tool Co., who has been away from actual railway service for the past sixteen years, commented on the apparently slow progress that had been made in solving the problem of hot boxes. In part he said:

"Mr. McVeigh has touched on the difficulty of getting lubrication at the back end of the journal. I would suggest that each inspector be supplied with an X-ray machine, so that he can examine the lubrication at this part of the box, and see that it is acting as it should do. (Laughter). Another matter that struck me rather forcibly was Mr. McVeigh's reference to journal bearings equipped with white metal. From what I have heard on this question, I was led to believe that they are putting less babbitt in journal bearings, because they are getting a much better mixture of brass than they were formerly able to do. I remember some years ago a certain agent came to see us in an effort to obtain the contract for brasses for one thousand box cars that were to be built. We explained to him, of course, that the whole matter was in the hands of the purchasing agent, and he went to see him. Some time after he came back and said: "Well, I got that contract, but he cut me terribly." I replied that we would expect him to supply brasses in accordance with what we wanted, and he said, "I will supply them according to the price," and that is just what we got. Some of those cars had to have all their original brasses renewed before they reached our line. Another matter is the question of housing passenger equipment. We take care of our locomotives very thoroughly, but the rest of the rolling stock does not get the attention in this respect that it should. Why?"

At this point, C. L. Higgins recited an incident in which he had suffered a loss of several thousand dollars, due to delay caused by a hot box developing on a train upon which he was travelling. As a direct result of his experience, Mr. Higgins has spent considerable time in designing and constructing a device that he claims will practically eliminate the railroad hot box.

He demonstrated with an appliance consisting of a telegraphic relay, an electric bell, with batteries connected to two posts between which was a fusible link. He showed how this link would fuse when the temperature of a journal box reached 150 degrees and the broken circuit would result in operating an electric bell in the road or at the engine house. He further explained

that a spring in the box could be released by the same operation which would drive a plate holding the packing and oil up against the journal, providing lubrication automatically.

In commenting on the subject of carelessness, C. J. Forrester, of the G. T. R. Car Department, remarked:

I think there is no appliance that is receiving more attention at the present time, but it must be remembered that when you start out with a passenger train that is running sixty miles an hour this means that the car journals are making 50 revolutions—this means that your journals have to do heavy duty and as soon as you get through the white metal you are down to the brass and the brass starts to give trouble. Forty to fifty per cent. of your trouble is due to starting out with new pairs of wheels, and I think that, all things considered—ten per cent. carelessness would be a better estimate. Another thing—in examining a freight train, an inspector will examine 200 or 300 journals per day. He cannot examine the back end of every journal nor see if the white metal is worn from the brass. I think if you examined your lists and saw all the white metal that was going in you would be surprised."

Owing to the abnormal conditions that existed during the war, when it was next to impossible to obtain and retain experienced men, the problems of railroad maintenance were surrounded with almost unsurmountable difficulties. In this connection, C. McNair, of the Galena Signal Oil Co., made the following statement:

"The conditions, during the last few years, railroads had to contend with were the worst ever experienced in regards to lubrication of their equipment. During the war there was a general shortage of railroad equipment and labor was at a premium. The United States Administration and the Canadian Railway War Board worked together, with one thought uppermost in mind, (win the war), did everything possible to keep cars moving, so much so that in many cases cars did not receive repairs which would have been considered necessary during normal times. Coupled with this, labor was so scarce that in many cases men were hired who were not efficient railroad workers, and as a last resort car foremen would give them jobs as oilers. Because they were called oilers and believing their work was pouring oil, they managed to get oil cans and poured oil in journal boxes until the wool waste became so wet and heavy that it lost its resiliency, settled away from the journals and in due time hot boxes were the result.

"Railroad employees in the United States received substantial increases in wages, and later same increases were put into effect on Canadian roads, but for some reason or other employees known as oilers are paid less than car repairers, therefore it is difficult to keep good men working as oilers. I would

strongly recommend that these men be paid more than repairmen, because, in my opinion, they have the most important work in a car yard. In this connection I would also recommend that they be given a better or more important title than "oilers." They are deserving of a real fancy name.

"For years instructions were issued showing the proper method of packing boxes (and a great many of the roads endeavored to carry out these instructions) which explained that a roll of waste be formed and applied to back of box, then packing put in from this roll up to the inside of collar at end of journal, then a plug or key applied in front of box, the packing in no case to extend above centre line of journal. In many cases, however, the packing was put in above centre line, the front plug was made of such dimensions that occasionally we would open the box cover and could not see anything but packing. Latterly some of the roads got away from this process by discontinuing the use of the end plug entirely. It was found that this practice gave inspectors a better opportunity to examine the box and bearings, and by watching for dry centres of journals, bearings which would likely run hot were detected, the cause discovered and the necessary remedy applied. This change has done a great deal to eliminate hot boxes.

"Our Canadian roads have been slow in making this change, however, and they lose considerable material when their cars go over into the States on account of these front plugs (which would weigh about one pound of packing in each box) being removed on other railroads and on returning our railroadmen put extra plugs back in cars which have had them removed.

"I have been associated with the Grand Trunk Railway for the past six years in lubricating their equipment and I do not hesitate to say that there are less hot boxes to-day than ever before per thousand car miles run."

Oil, like patent medicines, have their substitutes, frequently the latter showing their superiority. This was exemplified in the remarks of W. A. Booth, chief draughtsman of the G.T.R. at Montreal, when he said:

"I do not wish to hurt the feelings of any of our oil representatives here tonight, but in conversation with a conductor of a freight train some time ago, he seemed to have gotten out a substitute for oil. He said that whenever he had a hot box he ran back to his van and got some wood ashes out of the caboose stove, mixed them with the oil, and got to his destination without much trouble. You can take that for what it is worth. I think the shop people are sometimes to blame in that they at times will leave a knob or other irregularity on the top surface of the brass or key, and if this is not chipped off or removed it will likely result in a hot journal."

L. C. Ord, formerly connected with the

engineering department of the C.P.R., and who has recently returned from overseas, touched on the subject of wear as related to the varying sizes of the axle journals. His comment in brief was as follows:

"I do not know much about hot boxes to-day, but I have had a great deal to do with efforts to prevent them in the past. One speaker says most of the cars are running altogether on brass, another that they are running almost altogether on white metal. Both cannot be right. My personal opinion is that investigation will show that on most roads, and particularly in passenger service, more cars are running on white metal. A very important point in comparison of hot boxes to-day and years ago is in the diameter of the journals. A six-inch journal is moving across the brass at twice the speed of a, say, three-inch journal in the same train and even with the same load per square inch, is harder to keep cool. Another important factor is end wear. The bearing area at both ends of the brass has not increased in proportion with the weight of the car and end wear is greater and the lateral movement of the journal on the brass has a great deal to do with the displacement of the packing in the box, particularly in cold weather and in starting warming at the inside shoulder. There is another factor which is very important in so far as Canadian roads are concerned, and it is the question of low temperature. Railroading in Canada would be all right if it was not for the severe winters, and it is difficult during that season of the year to attend to journal boxes."

Here Mr. McVeigh asked for the expression of some of the members on the matter of end wear, as he had been informed that this was the source of some of the troubles of hot boxes. He also touched on the possibilities of the cone wheel having a more erratic movement than one with a flat tread. In reply, Mr. Ord stated:

"As the question has been put directly to me, perhaps I should answer it. The cone on the wheel is to assist in curving and to reduce flange wear. The question of sharp flanges bears on the same point. When you measure them up you never find a sharp flange without finding a large wheel and a smaller wheel on the same axle. It may be due to bad mating in the first place, or to unequal hardness of the two wheels, one wearing faster than the other in service. These wheels would hold steadily to the worn flange on straight track. The new cone wheel does very little 'hunting' from side to side on the rail. The side movement of the brass on the journal is caused by the swaying of the car body, due to track and service conditions and not to the wheels."

"The lateral wear of the brass is affected by the lubrication on its face and on the inside edge, which latter is a hard place to get at and the hardest place

to lubricate, due to the displacement of the packing by the plunger action of the journal. If you had an X-ray machine and could examine carefully and readily the back end of the box at all inspection points you could prevent 75 per cent. of the hot boxes."

The mention of an X-ray machine brought a remark from Mr. McNair to the effect that such an apparatus was now in use, in the shape of an iron made of such dimensions that it would reach to the back end of the box, and with it it was not only possible to know how much packing was in the box, but that the same could be adjusted to the journal. The Club was fortunate to have at the meeting, R. W. Reid, an official of the Midland Railroad of England, and his remarks which follow give a good idea of English practice.

"I am very much interested in listening to this paper on hot boxes. I am engaged on a railway in England where the hot box trouble is not unknown. As you probably know, a very large proportion of the wagons are private property, and a large number of these wagons are lubricated by grease, which is fed through holes in the brass at the top. That practice has been found unsuitable for freight and passenger vehicles running at high speed, and 90 per cent. of the vehicles in fast freight trains run at a speed of fifty miles per hour, and are running in oil bearings, which are faced with white metal. We never count on the bearing wearing through. Several gentlemen here have referred to the quality of white metal and it is a very important thing. If you buy white metal indiscriminately you will find its largest constituent will be lead, and lead is not suitable for carrying heavy weights. To give you a good running bearing it must have a large proportion of tin in it. Most of the English railways lubricate the journals by pads carried on springs in a frame. This pad can be taken out. One or two of the roads use waste packing. Since the war there has been a common use of wagon stock and my railway—the Midland—and some of the others, have taken a record of the number of hot boxes occurring on freight trains, and also the type of box and the packing, and our opinion is quite definite that the waste packing is inferior to the pad. Some gentlemen have referred to the difficulty of examining the back end of journals. That does not exist where you have the pad. Altogether the pad has everything to recommend it. You speak of the difficulty of operating in this country on account of the severe weather. If you use mineral oil, as we do, this oil does not freeze until the temperature gets very low, but if you have water in your box, which is picked up when the engine lifts water at the troughs, you then have ice on the top and the bottom of the oil well. The waste packing has very little resiliency, and, with the present tendency to economy, the waste is taken out and cleaned and put back again, and it is then not

as good as when it is new as the horse hairs or other springing materials have been taken out. I do not know whether you have tried the pads. If you have, it would be interesting to hear what results were obtained from them. We have another type of box used in India, where they have extreme heat, and they use an eccentric steel disc which is fastened on the end of the journal. The oil lies in a well in the box and the disc picks it up and throws it over the bearing. This box has given very satisfactory results. It is patented, however, and we have never used it in England. I thank you for the opportunity of speaking to you."

The mention of the oil pads for lubricating axle bearings brought forth a few remarks from Geo. E. Smart, master car builder of the C.G.R., who stated:

"I would like to discuss some of the points raised by Mr. Reid on the different appliances used on the British railways. A number of years ago suburban trains were equipped on the Grand Trunk Railway with ring oilers somewhat similar to the design used on electric and other machinery. They were a success during certain periods of the year, but failed during the extreme winter weather, resulting in some cases in burning of the journal and skidding of wheels. The pad system was also tried out in this country on trains running between Montreal and Ste. Agathe, on the C.P.R. This also was a success during summer weather, but gave trouble during the winter months. The pads were held or pressed up against the journals by means of small coil springs which were riveted to a metal frame inserted inside of the journal boxes, but the extreme cold was the cause of the springs breaking away from the frame, resulting in the pad not being held in contact with the journals, and in each case the railways went back to the ordinary saturated waste for packing the boxes, and there is nothing yet, that I know of, that will give any better result than this method."

A point that was touched on by B. C. Gesner was that of the possible magnetic action that might be created through the contact of the different metals and the subsequent effect on the temperature of the bearing. His theory was stated, in part, as follows:

"I am not a member of this Club, but I listened with very great attention to all that has been said, as I have had something to do with hot box troubles in my time and when we come right down to the final analysis of the question it figures out in dollars and cents. I am, in a way, connected with the Canadian National Railways, and have had a certain degree of supervision over the lubrication of their rolling stock for a number of years past."

To be continued

Canadian Machinery Drafting Course—Part V

The Circle, and Its Various Divisions, and Measurements of Angles Defined—More Problems Given Together With Explanatory Data—Fifth Plate of the Course

By J. H. MOORE, Associate Editor Canadian Machinery

BEFORE proceeding with this, the last portion of the subject of geometrical drawing, let us review briefly where we left off in the other two parts published. We were so far gone through the definitions, from a straight line up to the divisions of quadrilateral figures, and have also completed twelve problems dealing with the preceding matter discussed in these two former parts, so now let us first continue with the geometrical definitions before entering any further actual problems.

Circles

We have so far not stated in defined terms what a circle actually is, so let us consider this point.

A circle is a plane figure bounded by a curved line called the circumference, every point of which is equidistant from a point within, commonly called the centre of the circle.

A circle in turn has other lines which can run through it, each having their proper name, so let us consider a few of these.

Referring to the chart at Fig. 1, we first see the circle itself, *O* being the centre point. Fig. 2 shows certain added lines to the circle, each having their proper name, *A* being the diameter, *B* the radius, and *C* the tangent to that circle. From this we gather that:

The diameter of a circle is a straight line passing through the centre, terminating at both ends in the circumference.

The radius is a straight line joining the centre with the circumference.

The tangent is a straight line, which touches the circumference at only one point, called the point of contact.

Fig. 3 continues with further. Here we see a line *A* passing through two points on the circumference. This is known as a chord. The line *B* represents a chord of a circle, or a straight line which joins the circumference of a circle, and does not pass through the centre of the circle. This line is called a chord of a circle.

Fig. 4 shows a circle with a sector. The sector is an area bounded by two radii and the arc between them. The angle between the two radii is called the central angle.

Fig. 5 shows a circle with an inscribed angle. The inscribed angle is an angle whose vertex is on the circumference of the circle, and whose sides are chords of the circle. The angle subtended by the arc at the centre is called the central angle.

The Measurement of Angles

Before passing on to the next figure let us for a moment consider what we know about angles. We have so far learned in this course regarding the triangles used, namely, the 30°-60°; also the 45°. On each of these there is one angle, which is termed a right angle, which, as we all know, equals 90°. To go still further, we know that if we construct a circle as shown at Fig. 7, and draw diameter lines *AB* and *CD* at right angles, that we obtain the angles *E*, *F*, *G* and *H*, each equal in turn to 90°, or four times 90, or 360 degrees for the complete circle.

Having established in the reader's mind this point clearly, let us pass on to Fig. 8. Here we see a circle divided into 20 parts. Each of these parts is equal; therefore we can take 360 and divide it by 20, which shows us that the angle in each separate sector is 18 degrees. We only point out this illustration to start the germ of the idea of angles into students' minds, for it is something which will very soon crop up in this course, when naturally we will go into the matter deeper. In the meantime students should remember that a circle has always 360 degrees, a semi-circle (or half a circle) 180 degrees, and that the sum of the angles on any triangle must always equal 180 degrees.

Solids

We shall now consider solids. First, what is a solid?

A solid has three dimensions—length, breadth and thickness. (Readers will remember that plane figures had only two dimensions—length and breadth.) Solids are subdivided into classes, the more generally used of which are cylinders, cones and spheres. Fig. 9 shows a cylinder, Fig. 10 a cone, and Fig. 11 a sphere.

A cylinder is a solid having two equal parallel surfaces as bases, these being bounded by curved lines. The bases are usually circles, and such cylinders are called circular cylinders.

A right cylinder is one whose side is perpendicular to its bases. Fig. 9 illustrates a cylinder of this type.

A cone is a solid bounded by a conical surface and a plane which cuts the conical surface. The plane is called the base, the point which it tapers up to is called the vortex. The altitude of a cone is the perpendicular distance from the vortex to the base.

A sphere is a solid bounded entirely by a curved surface, every point of which is equidistant from the centre of the circle. A ball is a sphere, provided it is entirely round. Fig. 11 represents clearly the construction of a sphere. The shading on this view is given merely to create the appearance of the ball being round.

Let us now give one more definition before starting on plate No. 6.

An ellipse (illustrated at Fig. 12) may be defined as follows:

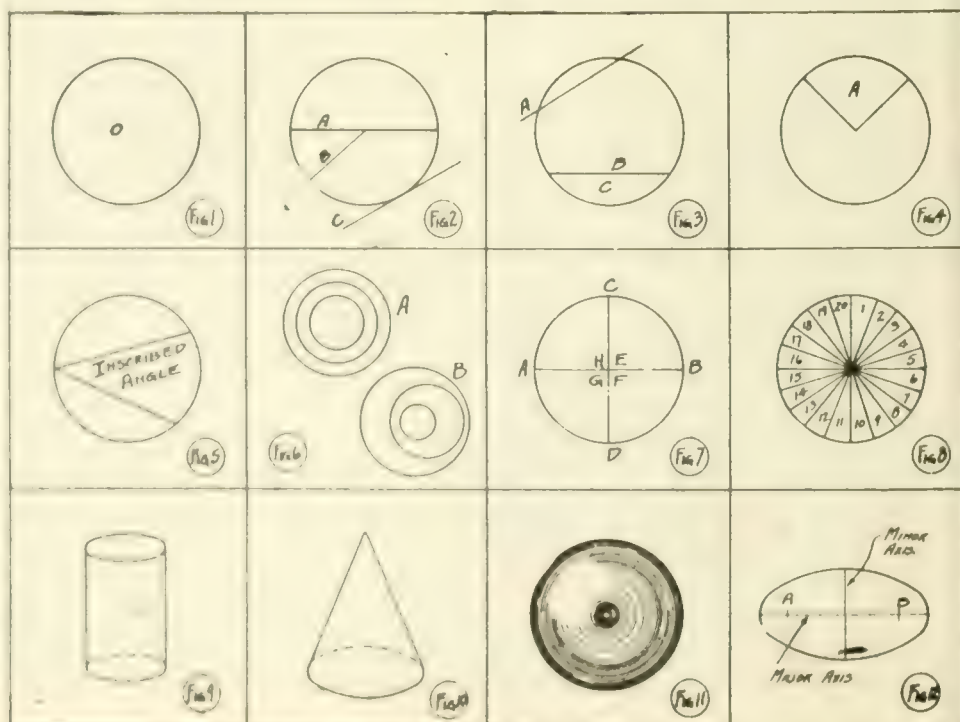
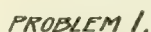


FIG. 1 TO 12. FOLLOW THESE CLOSELY WITH THE TEXT.

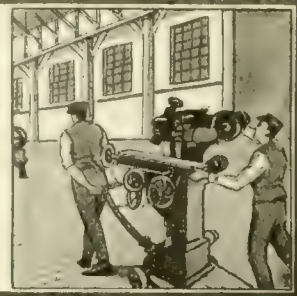
Continued on page 473



HERE IS PLATE NO. 6. SEND US IN YOUR WORK AS SOON AS POSSIBLE.



DEVELOPMENTS IN SHOP EQUIPMENT



OLIVER NO. 166 HAND-PLANING AND JOINTING MACHINE

The illustrations show the No. 166 hand planing and jointing machine that has been recently placed on the market by the Oliver Machinery Co., Grand Rapids, Mich. Fig. 1 shows the front of machine and its general appearance, while Fig. 2 is a detail view, showing the motor and cutter.

A direct motor drive is used, the machine operating at 3,600 r.p.m., on 3-phase, 2,220 volt alternating current. The cylinder is of the three-knife type, the outer end being shaped to receive the rotor. The stator is held by an adapter attached to the frame of the machine, and by the outer end cover.

The bed, table, in fact all parts, are rigidly constructed, and the capacity of machine is made in 5 widths, 9, 12, 16, 20 and 24 inch, respectively. Table permits a cut up to $\frac{3}{4}$ -in. in depth.

The cylinder bearings are of the self-aligning, frictionless, ball type, requiring little attention.

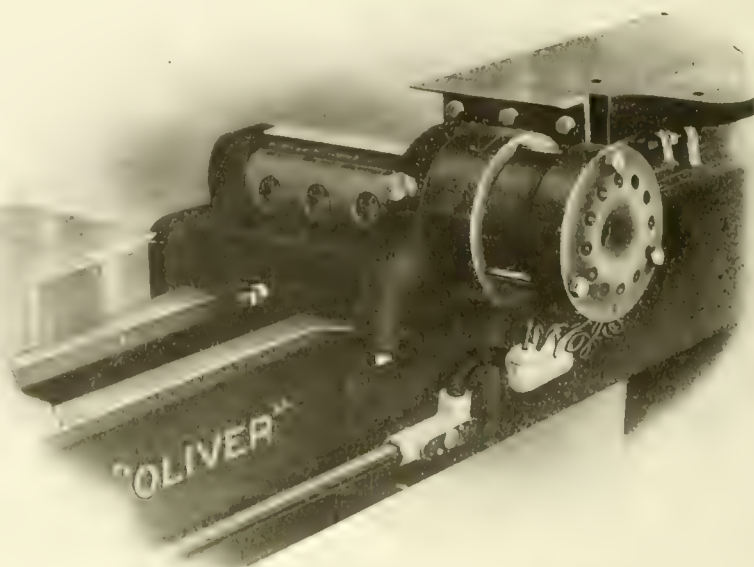


FIG. 2 CLOSE UP VIEW OF MOTOR AND CUTTER.

brought out particularly for the heavier classes of work, such as found in locomotive and car shops, shipbuilding plants, tube and steel mills and also they will prove an excellent size on oil well tool work.

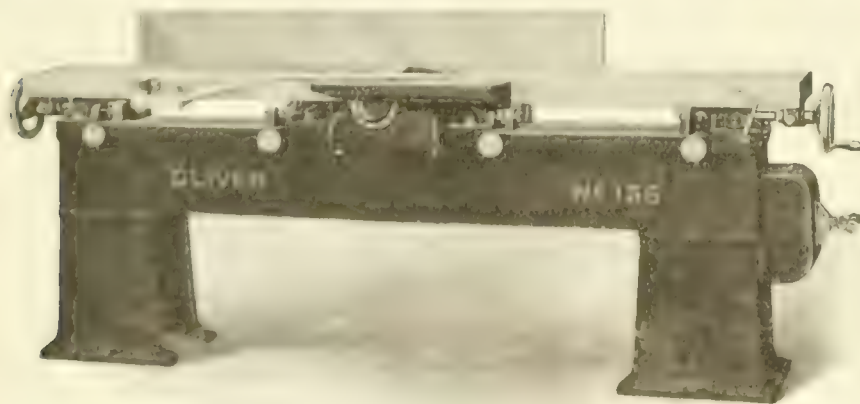


FIG. 1 GENERAL VIEW OF THE MACHINE

The United Hammer Co., Boston, Mass., comment as follows: Safety devices being the order of the day, we have just brought out a guard for the Fairbanks power hammer, which, while it completely covers the working parts of the machine and thus prevents any further damage to the operator, leaves the parts in working order for the purpose of speed and efficiency.

The frame of the hammer is of the most solid construction, the parts being of the best material, which affords the most perfect protection to the operator.

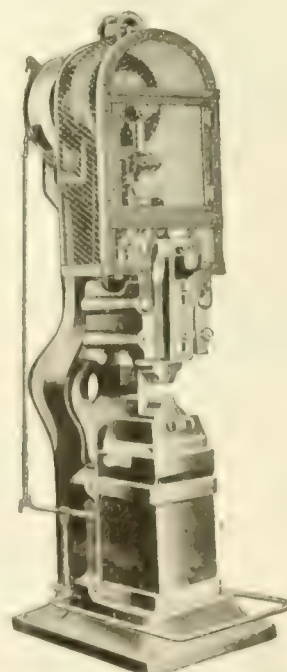
They consist of steel castings, of the highest quality, and are of the

and we are prepared to furnish it to all present users of these machines who may desire the same.

The illustration herewith shows the idea clearly.

It may interest readers to know that we are now prepared to furnish Fairbanks power hammers in sizes up to and including 500-lb. weight of ram; this last named size, together with a 400-lb., having just been added to our line. Heretofore Fairbanks hammers have been built only up to 300-lb. weight of ram.

These 400 and 500 lb. hammers have been



GENERAL APPEARANCE OF THE HAMMER.

"W. & B." HAMMERS

An unusual method of displaying hammers has been introduced by the Whitman & Barnes Manufacturing Company, St. Catharines, Ont. The Adze Eye Nail Hammer display is an attractive easel in three colors, mounting three handsome full-polished nail hammers—octagon, beil, and plain-faced types. The size of the easel, 15 by 11½ inches, not including hammers, makes it convenient for either counter or window display.



THE METHOD OF DISPLAYING THE HAMMERS.

These hammers are drop-forged, heat-treated, hardened and drawn to just the right temper for the work required of them. Special attention is paid to the design to see that the lines are correct, the balance perfect, and the striking power concentrated in the head. The handles are second growth, straight grain, white hickory, wax finished in natural color. A flare at the hand grip prevents slipping. Special steel wedges prevent the handles from coming loose.

A superior feature of the nail hammers is the peculiar design of the claws. The pitch is steep to give them a faster draw. The split permits the claws to take any nail down to the smallest brad, the grip being secure in the shank of the nail, not depending on the head. The value of this feature will be especially appreciated on repair jobs.

NOTICE OF NEW CATALOGUE

The Wood Turret Machine Co. of Brazil, Ind., have issued a new catalogue showing a full line of the Tilted Turret screw machines, turret lathes, brass-working machines and extra capacity automatic chucking turret lathes. Illustrations and specifications of various types of screw machines and turret lathes are shown as well as cuts detailing the construction.

Several pages are devoted to new improvements and special construction.

Considerable space is given to tooling equipment and various special fixtures that can be furnished with or applied to the Tilted Turret.

A NEW MACHINE

The Riverside Machinery Depot of Detroit, Mich., have recently placed on the

market the Daly combined die sinking, milling, and charring machine. This machine is equipped with adjustable taper bronze bearings, hardened cut gears, eight spindle speed, and powerful positive drive. We are informed that further information, including illustrated pamphlet, can be secured upon request by those interested.

"W. & B." AUTO TOOL DISPLAY

The Whitman & Barnes Manufacturing Company, St. Catharines, Ont., are offering dealers a handsome display of "W. & B." automobile tools, made in Canada. The essential tools, ball pein hammer, plier, adjustable "S" wrench, automobile wrench and screwdriver, are mounted on a steel easel 13¾ by 19 inches. The easel is lithographed in three colors, and the display makes a strong selling appeal when used on counters or in windows.

The tools are of the very highest quality, and all bear the "W. & B." diamond trade mark. The hammer is handsomely finished; head is a high carbon steel drop forging, hardened and drawn to just the proper temper, and secured to the handle with a special steel wedge. Handle is straight grain, air dried, second growth white hickory, wax finished in natural color. The pliers are made of drop-forged steel, finished either black or nickel-plated. It is of the slip-joint type, 6½ inches long, with screw-driver end. The adjustable wrenches are drop-forged and fitted with case-



BOARD DISPLAYING AUTOMOBILE TOOLS.

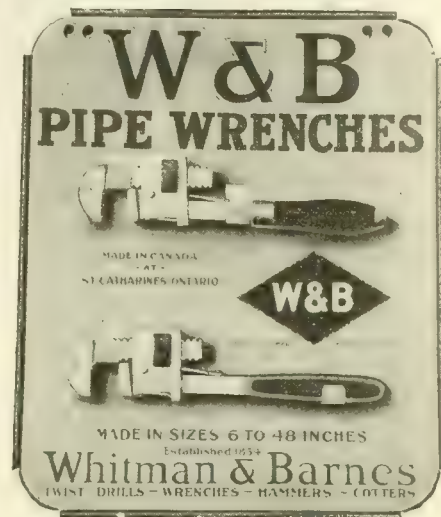
hardened adjusting screws of the "W. & B." easy-acting pattern. Screw-driver blade is a tool steel drop-forging, fitted into a fluted hardwood handle with steel ferrule.

"W. & B." PIPE WRENCH DISPLAY EASEL

The Whitman & Barnes Manufacturing Company, St. Catharines, Ont., have

a new display easel to assist their dealers in selling pipe wrenches. The easel is made of sheet steel, attractively lithographed in colors. It carries one each steel and wood handle pipe wrench, and is of such a size that it can be conveniently used either on the counter or in trimming the window.

In their endeavor to produce the finest product of its kind, the makers have



VIEW OF THE PIPE WRENCH BOARD.

spared no expense that would contribute to improve the quality. Bar and jaw are high carbon drop-forgings, heat treated and tempered to insure maximum strength. In addition, both bar and jaw are reinforced at points of extreme pressure or strain. The teeth are milled, insuring a slipless grip. Adjusting nuts are cut from solid steel and case-hardened. "W. & B." wrenches are so designed that the frame is rigidly supported by the drop-forged bar, relieving the frame pin from any strain.

The handsome appearance of these pipe wrenches is in keeping with their quality. The jaws and bars are highly polished and the ebonized wood handles are reinforced with steel ferrules.

CANADIAN MACHINERY DRAFTING COURSE

Continued from page 470

just your curve from time to time until the figure is completed. It requires considerable practice to draw a good curved line by this method, and readers would do well to practise this problem on a separate piece of paper before putting it on the plate. The neater the work, the better looking the curve, and a great deal depends on the student's taste and accuracy of eye.

Now, having completed the third portion on geometrical drawing, we will in our next plate take up an entirely different subject, so keep your eyes open for the next issue on this course, sending your work along as usual in the meantime. Have you secured a prize as yet? If not, why not this time?

The MacLean Publishing Company

LIMITED

ESTABLISHED 1880

JOHN HAYNE MACLEAN, President H. T. HUNTER, Vice-President

H. V. FERRILL, General Manager

PUBLISHERS OF

CANADIAN MACHINERY

AND MANUFACTURING NEWS

A weekly journal devoted to the machinery and manufacturing interests.

R. G. NEWTON, Manager A. R. KENNEDY, Managing Editor.
Associate EditorsW. F. SUTHERLAND T. H. FENNER J. H. RODGERS (Montreal)
J. H. MOORE

Office of Publication, 145-151 University Avenue, Toronto, Ontario.

VOL. XXII TORONTO, November 6, 1919 No. 19

PRINCIPAL CONTENTS

Canada Must Work to Secure Export Trade	453
Canadian Machinery as an Advertising Medium	456
Accidents Have Taken a Back Seat in This Plant	457
Making Steel in Canada	462
The Story of How One Galt Concern is Forging Ahead	465
Solving the Problem of Why is a Hot Box?	466
Canadian Machinery Drafting Course—Part VI	470
Developments in Shop Equipment	472
Editorial	474
Market Developments	476
Selected Market Quotations	76
Industrial Developments	80

Dangerous For Canada

THE latest strike in United States is poor business for that country, and poor business for Canada. It will give new life to the tired-out steel strike, for the very good reason that steel plants cannot run long without their supply of coke. Coal is not stored in very large quantities at the coking ovens of steel plants. It takes too much room and too much handling.

Canadian firms have had strikes and troubles of their own this year, and they have had them when they were trying to bridge the dangerous interval between war work and peace lines. Now they find that in addition to their own troubles they are hit by plottings and upheavals across the line.

There are Canadian manufacturers who cannot secure raw material with which to go ahead with their season's programme.

The agitator who is crippling the U. S. mines and steel plants is going to take work away from Canadian workmen this winter unless things turn very quickly for the better.

These things must be taken seriously by Canadians. A country with such natural resources as the Dominion should never allow its industrial future to be placed in jeopardy, as present conditions have revealed.

The Need For Apprentices

CANADA needs apprentices if she is going to succeed as an industrial and manufacturing country. Canada needs shops that will teach the apprentice something more than the theory that he can get out as a handy man at a turn of an Operation No. 4 or Operation No. 10, as the case may be.

There are tool rooms and there are drafting rooms that do not want to be "bothered with" apprentices. The one big demand of the institution is for production. The demand for producing great quantities of a given article

in a short time is the big consideration, and in such an atmosphere it is an easy matter for the apprentice to become "handy" in some particular capacity and stay right there.

If your shop has nothing to offer an apprentice, be honest enough to say so.

You can turn out a mechanic—a rare man nowadays—a machinist, or a specialist. The boy who comes to your shop to learn a trade is entitled to know, all things being equal, what he has a chance of becoming. If only a specialist on some speed production idea, tell him so, in order that he may not waste three or four years of his time on it.

It is short-sighted policy, taking the mechanical field as a whole, to be too busy to "bother with" apprentices. If Canadian firms are going to turn out a product that will stand up in competition with the world, then we must have more and better mechanics. We must aim to bring mechanical excellence, knowledge and practice to such a degree that we can design and build precision tools as good as any on the market.

The shop that is too busy to "bother with" apprentices, but is willing to reach over and steal the finished product by means of a few extra dollars per week has a knot-hole conception of the duty it owes to the industrial fabric of Canada as a whole.

A Decreased Wage Coming?

PREMIER-TO-BE DRURY spoke for the Victory Loan at a meeting in Barrie, and gave it as his opinion that the day of the decreased wage was at hand. With this he coupled the statement that the day of the inflated price of wheat is also at hand.

In a general way the man in the factory will not quarrel with this state of affairs. For his purpose it makes little difference whether he earns \$1,000 and spends it all for living, or whether he earns \$2,000 in an inflated era and parts with it all in order to keep going.

The one big objection is that our national war debt was incurred in a time when dollars had small value. If we pass now to a period where there are fewer dollars with larger buying powers, it will not assist in liquidating our war debts.

The average man, though, is interested in the first instance in bringing about an era where he will get a fair run for his money when he puts his dollar into the markets.

Such a condition would do more than anything we know of to bring about a healthy feeling of satisfaction that would boot out the strike fever and the strike agitator along with it.

Mr. Drury also reasons that Victory Bonds are a great anchorage in going through the period of deflation which must surely come. The man with a holding of Victories in his possession can sit tight no matter what happens. He doesn't need to scan the papers each day to see if his security has slumped or gone up in smoke.

And it might not be bad business to go in and buy bonds in these days when dollars move in a big way, because as the buying power of your dollar increases, your bond becomes more valuable to you.

The Victory Bond proposition is sure, no matter whether you agree with all the to-be-premier says of other things or not.

THE average man does not love war. But there would be quite a heap of folks ready to sign on if General Reduction started operations hereabouts.

ALTHOUGH the farmers rule Ontario, Old Man Hicost lingers in our midst.

THE assurance of Washington that Canada will not be discriminated against in the matter of coal shows more spirit than the threat to cut Canadian power off United States when it was short here.

The Dangers of the Great Lakes Seasons

By T. H. FENNER, Editor Marine Engineering

THE salt water sailor is apt to sniff contemptuously when he hears of the sailors of the great inland waters of the North American continent. He is apt to refer to that class of navigation as dry land sailing, and to couple it in his mind with the navigation of the Mississippi, where the leadsman takes his soundings in inches instead of fathoms. When he is better acquainted with the problems and dangers of Great Lakes sailing he acquires a commensurately greater respect for the responsibilities and troubles of his fresh water brother. Most deep water skippers are troubled and uneasy when making the land, especially if the weather is thick and the shore is a lee shore. Their fresh water contemporaries are nearly always comparatively close to land, and whichever way the wind blows, a lee shore is not so very far away.

These thoughts were prompted by the occurrences of the past week when in the first of the fall gales, two vessels were lost on the lakes, taking a toll of thirty human lives. The "City of Muskegon," making for port in a heavy gale of wind, was thrown bodily on to the breakwater, and foundered in fifty feet of water right at the entrance to her harbor. Most of the passengers saved their lives by jumping ashore, so close were they to safety. However, before they could all reach it the ship went down and twenty-one lives went with her. The second vessel, the "Homer Warren," was simply pounded to pieces by the heavy seas, and went to Davy Jones's locker with nine of her crew. The tenth was saved by the fact that he was not aboard the vessel, but had gone home from the last port she touched at, by train.

Last fall, three brand new trawlers, built at Fort William, and manned by deep sea crews, left Fort William for the voyage to open water. Caught in a terrific gale, two of them disappeared from sight, and took their crews with them. One of them won through to safety, but had a terrible experience. The point is that these vessels were of a type that is usually able to ride out the worst weather that can be met with in the world's open waters. Even in that nightmare of all salt water men, the North Sea at its worst, these taut little trawlers make better weather of it than much bigger ships. Lake Superior proved too much for them, and Lake Superior is not the worst of the lakes. That doubtful honor is reserved to Lake Huron.

Even Lake Ontario can present dangers sufficient for the most adventurous. An old lake sailor told the writer a story of a trip on Lake Ontario which is worthy the pen of a Clarke Russell to do it justice.

SOME years ago, the wooden steam barge "Resolute" left Port Dalhousie, loaded with about 800 tons of coal, and towing two schooner-rigged barges. She was bound for Deseronto, under normal circumstances probably a twenty to twenty-four hour run. The period when this voyage was undertaken was before the advent of that marvellous help to navigators, the wireless. The season was the late fall, about the middle of November. The weather when leaving Port Dalhousie was fine and clear, with a light breeze blowing. For the first few hours all went well, but as they proceeded northwards a change took place. The clear skies became clouded over, and the soft sighing of the breeze changed to that weird sob which usually heralds a severe blow. The wind increased, the temperature dropped, and as is always the case on these waters, the sea mounted rapidly. Before long it got so bad that the "Resolute," with her heavy tows, became unmanageable, and it was necessary to cast them adrift. Fortunately, the two barges were schooner-

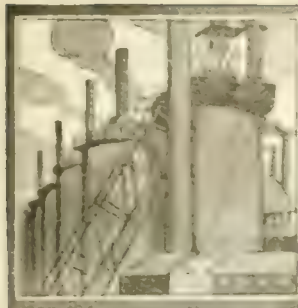
rigged and the crews were able to make a little sail, and bear up for shelter. This they reached safely, as was found out later, but for the time being they drop out of the picture.

Freed of her burden, the "Resolute" did better for a while. Soon, however, a new trouble developed. For some little time it had been noticed that steering was becoming more and more difficult. Examination of the rudder disclosed the reason for this. The low temperature was causing the spray thrown on the rudder pintle to freeze up and jam the rudder. When this was found out, a steam pipe was laid aft, and the jet directed down the pintle from above. This succeeded in freeing the rudder, and salt was freely sprinkled around the rudder head, which worked down the pintle and helped to keep it clear. Daylight had come by this time, but nothing could be seen but the viciously breaking waters. The captain judged his position to be somewhere near midlake, and knowing he could not hope to make Deseronto, he kept going straight down for the Thousand Islands. There was no sign of the weather abating, and all they could do was to keep the vessel riding as easily as possible. Getting down the lake in the vicinity of the Thousand Islands a fresh problem presented itself. If they went on, with the weather conditions as they were, and no clear assurance of their position, the chances were that the vessel would meet her doom on some of the rocky shores of the islands. The alternative was to turn back and run up the lake again, trusting to make Port Dalhousie. This was adopted, and after a hard struggle, the "Resolute" was turned round and headed up the lake, and to the south. As time went on the weather moderated, and finally they found themselves on a clear, bright morning close up to Port Dalhousie. This was just under five days from the time of leaving. Try to imagine five days buffeting with wind, sea, snow and ice, with land never far away, but practically out of touch with all the world. So much so that anxious families ashore had given their loved ones up as lost. The two barges, which had found shelter, had brought word of the "Resolute's" hard plight when she cast them adrift. The case seemed hopeless, and the relief was proportionately great when she came back, as it were, from the dead.

The business of the lakes must go on as does the business ashore, so once more the "Resolute," justifying her name, coaled up and started for Deseronto. Once more she left port in fine weather, and once more she ran into wintry winds and angry seas as she plodded north. Buffeting the gale, she proceeded down the lake, but as she approached the port her captain realized that he could never make it safely. He decided to proceed on to Kingston, reaching there safely and tying up after another hard struggle. Here word was received that they were to proceed to Deseronto, but feeling they had done enough, the crew signified that the only way to go to Deseronto was by train, for that season. So in Kingston she stopped.

THE classic instance of what the Great Lakes at their worst are capable of, is, of course, the terrible storm of November, 1913, which carried death and destruction on an unprecedented scale to the unfortunate ships and crews caught in it. This storm, which broke out on the 8th November, lasted till the 11th, and when it had passed on, left a trail of nineteen vessels totally destroyed. Two hundred and forty-four lives were lost. The property damage amounted to \$3,157,000. All this desolation in just three days! Besides this, twenty vessels were blown

Continued on Page 84



MARKET DEVELOPMENTS



The Raw Material Shortage Is Serious

Shipments Have Been Falling Off for Some Weeks and No Betterment is Noticed—Some Firms Are Very Short of Plates and Sheets, With None Coming In

IT has been claimed in this report for some weeks past that shipments of steel coming to Canada from the U.S. strike zone did not bear out the contention made that production at mills was increasing quite rapidly. Events of the past week have shown this to be increasingly so. Shipments are more tardy than ever, and there are places where not a pound of sheet or plate has been received for almost three weeks.

One Canadian manufacturer returned this week from booking a nice line of tractor business in the Canadian West, and at once set to work to buy the material required to go ahead. On approaching the steel market he found that his troubles had only begun. He was not able to secure any material, nor was he able to get a delivery promise that would be of any assistance to him for purposes of winter manufacture.

The coal strike, if it lasts, will make matters worse, and may have the effect of putting new zest in the rather

tired-out steel struggle. Steel mills use such a tremendous amount of coal that it is not possible to store a supply for any length of time. They depend, rather, on a steady supply coming in, the coal going directly and at once to their coking plants.

Delivery dates are still some distance in the future on machine tools, and considerable business is being lost to some firms on that account. As a general thing a dealer acts as an exclusive agent, and if he cannot get anything better than a May delivery from his principals, he simply has nothing left but to pass up the business.

The scrap metal market is in a poor condition for the moment. Strikes, and talk of strikes, has battered down any strength the market had. Buyers look for lower figures while sellers do not want to take the prices offered at present by the dealers. The result has been the bringing about of a condition not far removed from stagnation.

CANNOT SECURE ENOUGH MATERIAL

Shipments of Steel Are Away Off And The Demand is Growing Very Keen

TORONTO.—The coal strike on top of the steel strike in United States is causing certain industries on this side of the line to stop and think where it is

They are not able to get deliveries that will satisfy their

Deliveries Are Slow

Agencies in Canada which are handling American lines are losing sales

at a factory out-

way since the clearing out of the shell shops.

Shipments Are Very Slow

"We are at our wits' end to know what to do," was the response that CANADIAN MACHINERY received on asking one Toronto warehouse what shipments were coming through from the strike area of United States. "We thought we were having tough skidding last week, but this week is worse many times over. It is now over 17 days since we have had a shipment of sheets or plates in our warehouse, and orders that were booked to go direct to our customers are faring very little better. Last week we thought we were fortunate because we received a good sized shipment of boiler tubes, but on looking through them we find that the mills that shipped to us were away off on standards, and that most of the material we received were lengths and sizes they had in stock. The ability to ship the much-wanted sizes would have been proof to us that they were operating at something like fifty or sixty per cent. capacity, but it looks as though they were off entirely."

It is hard to convince some of the consumers in this district that production

willing to make the best he can of what may be in the shipment.

A Case in Point

One Ontario manufacturer, who conducts a nice business in one of the manufacturing towns of the province has just returned from a trip through the Canadian West, booking tractor business for spring delivery. On his return he found that he had orders for between 75 and 100 machines, so he immediately started to visit the warehouses and agents with a view to securing a supply of material, only to find out that he could get no promises of delivery, let alone any ready material that could be sent along as a starter.

The prices quoted on another page of CANADIAN MACHINERY this week have not been changed because business is being booked at old prices, but there can be no doubt that the prices we give are purely nominal. It is well known that premiums are being paid in many cases, depending on the urgency of the business.

As a general thing it can be stated that the large steel companies across the line, headed probably by the Steel Corporation, are adhering to old prices, and as the last report of the corporation showed very large earnings, there seems to be good reasons to suppose that prices will not go up, although it must be admitted that the scarcity of ma-

terial now is tending to make them unusually firm.

The Scrap Market

Industrial uncertainty, strikes, and all the other things that are parading across the business stage at present, have acted as a road roller to the scrap metal market. It is a hard matter to size up the situation at all. There is only a small volume of business moving. Sellers do not want to take the prices that are being offered by the dealers at present, while on the other hand buyers, watching the trend of the market, are under the impression that prices are due to slump.

It did look a few days as though the whites were due for a better period, and it was felt that there might be some increase in these, but for the present they are dull and stagnant.

In reference to the prices of metals it is well worth noting that cast iron and stove plate, when spoken of in tons, mean net tons in Ontario, and gross in Montreal.

STEEL STRIKE IS BEING FELT NOW

Several Industries in Windsor District
Have Very Little Raw Material on
Hand

WINDSOR.—As the steel strike in the United States continues Border Cities industries, while suffering from the lack of steel, are putting up a gallant battle to keep their businesses going, and although conditions at present are far from satisfactory, they hope that they will be able to proceed with their work until matters over the border are settled. An official of the Canadian Bridge Company stated that the company is managing to get a little steel, but not nearly as much as their normal import and that it is difficult to say exactly how long the plant will be able to continue operations.

The steel possessed and made ready for export to Canada by American firms prior to the strike has gone up in price and is difficult to obtain. Very little steel is being secured from Canadian factories. Most of the factories in the Border Cities using steel in the manufacture of their outputs frankly admit that they are up against it, and will have to close shop if more steel is not forthcoming in the near future.

The Dominion Forge and Stamping Company of Walkerville, which has been inconvenienced, will probably be able to open in about 10 days, it was announced to-day. This company expects to get a shipment of steel shortly, and officials are confident that business will soon be resumed as usual and with a normal output.

Large Marine Engines. The Golden and McCulloch Co. of Galt shipped to Three Rivers and Quebec two of the largest marine engines ever built in an inland Canadian city. Both engines are for the Canadian Government marine and will be installed in "Canadian Trapper" and "Canadian Settler."

COAL ON TOP OF STEEL STRIKE CAUSES CONCERN IN PITTSBURGH

Special to CANADIAN MACHINERY.

PITTSBURGH, Nov. 5.—The iron and steel strike, now in its seventh week, has been receding at a decidedly more rapid rate in the past ten days than in earlier weeks. The most marked progress in resumption of operations has been in the Mahoning Valley, where for about three weeks there was no operation at all. The Carnegie Steel Company is now operating about four of its six blast furnaces in Youngstown, together with one of the two Bessemer converters and a few of the open-hearths. Seven finishing mills at the Ohio works are operating while practically the whole McDonald plant, nearby, is in operation. The Carnegie operation is the more remarkable from the fact that the company made no strong effort to resume operations, feeling that the distinctly home companies, particularly the Youngstown Sheet & Tube Company and Brier Hill Steel Company, should lead the way. These two companies, together with the Republic Iron & Steel Company, are now showing a fair operation, having among them about six blast furnaces operating, with corresponding steel and finishing departments. Re-

ports from the Chicago district are of much better operation there, but information is lacking here as to details.

Western Pennsylvania is now running very nearly full, with the exception of Donora and Monessen, which are still greatly crippled. Tonnage outputs are very satisfactory. For instance, one large plant, whose output was curtailed at the height of the strike by one-third or more, has lately been producing at 80 per cent. of the average rate in 1918, this being equivalent to 85 or 90 per cent. of the rate just before the strike.

A detailed estimate, by districts, based upon such information as is available, indicates that steel production is now at about 63 per cent. of the rate obtaining just before the strike. While this indicates quite a curtailment remaining, it should be noted that the production is well in excess of any output attained prior to the year 1912, and in those earlier years the steel industry thought it was producing a very large tonnage.

Bearing of Coal Strike

The iron and steel strike, however, has had to yield the centre of the stage to the coal strike, which is of importance both as to the curtailment in steel production it may cause, if prolonged, and as to the influence it will exert upon the subject of strikes in general.

The steel mills have some stocks of coal but these stocks are not large by comparison with consumption, it being a physical impossibility for a steel mill to stock sufficient coal to last it any considerable length of time, too much space and too much handling being involved. Some of the mills claim that they have stocks sufficient to last for four weeks, but the general average cannot possibly be as high.

The coal strike is different from all other strikes in that it is directly contrary to law, the Government having decided that it is in violation of the Lever food, feed and fuel control act, passed as a war measure, and in force until the President issues his peace proclamation. The coal strike is in violation of the contract the miners' officials signed with the operators, but of course, that does not differentiate it from many other strikes that have occurred.

The extent of the coal walkout cannot be stated definitely at this time. There are conflicting claims. It may be assumed that the walkout is quite general if not almost universal at the union mines, but there is no walkout at all at non-union mines. Interest centres chiefly upon the rate at which men go back to work, as the operators as well as disinterested observers expect that they will go back. The injunction granted Oct. 31, at the instance of the Government, forbids the union officials to do anything in furtherance of the strike, though it does not apply to the miners themselves. Accordingly, the situation

POINTS IN WEEK'S MARKETING NOTES

The automobile business continues to be the large buyer of tools in U.S. market.

Shipments of sheets and plates are becoming very tardy, and some plants are not far from the point where they will have to close down some departments.

It is not possible for steel companies to store coal to keep them going for any length of time, it calling for too much storage space and too much handling.

Premiums are being paid in Canada for deliveries of sheets and plates, although the steel companies are themselves sticking to the old schedule.

Scrap metal market is dull, buyers looking for lower prices, and sellers not wanting to take the prices that are offered.

Several very nice orders for machine tools have been lost lately because delivery dates were too far off.

Pittsburgh reports some sales of bars at \$2.50 to \$3 a ton premium, and sheets at a premium of \$2 to \$4 per ton.

is the same as if the labor elements had called the strike and then suddenly disappeared. The general belief is that the Government will use all its resources to prevent anything being done in furtherance of the strike, this applying to activity of union officials, the paying of strike benefits, and efforts of strikers to intimidate workers. Often the Government is slow to begin acting, but there is no question once the beginning is made.

One point in the change of conditions produced by the Federal Government taking its stand against the strike is in connection with the Connellsville region, which has always been non-union. Previously it had been thought very probable, in coal and coke circles, that in the event of a strike of the union mines the strikers would march upon the Connellsville mines and close many, if not all of them. The moment the Federal Government announced its position this opinion was changed. Furthermore, Governor Sproul, of Pennsylvania, has made a plain statement that order will be maintained. It is regarded as established that the Connellsville region will operate, and this is very important in view of the fact that from an exclusively coke producing region it has in the past few years become a large shipper of coal. It may be estimated roughly that in normal times the region produces half a million tons of coal a week, which it converts into coke, and half a million tons of coal which it ships.

Among steel producers the view is that the coal strike will help to settle the steel strike. If the coal strike fails promptly it will further undermine the morale of the remaining iron and steel strikers, while if the coal strike is severe enough to curtail the production of steel the iron and steel workers will be given some idleness they were not counting upon, making them the more ready to go back to work when opportunity is afforded.

Steel Prices

While basis prices for steel products are being held down by the United States Steel Corporation and large independents adhering to their former prices, the March 21 schedule, export prices have shown a sharp advancing tendency and some of the smaller independents, able to make early deliveries, have been charging advanced prices, this representing in substance a delivery premium. Merchant bars have thus been sold at \$2.50, Pittsburgh, or \$3 a ton premium, and sheets at \$2 to \$4 a ton premium.

Pig iron has shown a sharper advancing tendency. The first stiffening in pig iron prices occurred towards the close of June but it has been only in the past few weeks that the market has been strongly advancing. Eastern Pennsylvania prices are now a total of \$4 a ton from the low point of last June, and Buffalo, Cleveland and Chicago are all up, by an average of perhaps \$2 a ton. The best quotation in the local market, No. 2 foundry (1.75 to 2.25 per cent. silicon) is now available on the basis

of \$28.75, valley furnaces, or \$2 above the March 21 prices, which the furnaces had adhered to until quite recently. Some odd lots for prompt shipment have been sold at much higher prices.

There has been an irregular market in

Connellsville foundry coke, which sold as long as a week ago at \$8.00 per net ton at ovens, as an outside price. Ordinary good brands have been quotable in the past few days at \$6.50 for open top loading and \$7.00 for box car loading.

AUTOMOBILE BUSINESS IS STILL BUYING HEAVILY IN U.S. MARKET

Special to CANADIAN MACHINERY.

NEW YORK, Nov. 6, 1919.—In the face of the strike of soft coal miners and other labor troubles, the demand for machine tools and allied equipment continues to be remarkably good. One of the largest inquiries now before the trade comes from the General Electric Co., Schenectady, N.Y. A list of about 50 tools issued two or more weeks ago has been supplemented by another list of about 60 tools, and there will be further inquiries. New equipment is to be bought by this company for a new shop at Schenectady for the manufacture of wireless telegraph apparatus.

Eastern machine-tool builders continue to get a good volume of business from the automotive industry. Such companies as the Studebaker Corporation, South Bend, Ind.; the Nash Mo-

tors Co., Kenosha, Wis.; the Samson tractor works of the General Motors Corporation at Jamesville, Wis., the Stromberg Motor Devices Co., Chicago, and others have been fairly large buyers. In the East a new automobile company, the duPont Motors Mfg. Co., Wilmington, Del., in which Alfred I. duPont is a prime mover, will shortly be in the market for equipment. The Willys Corporation is preparing a list of its machine-tool requirements for its recently acquired plant at Elizabeth, N.J.

Miscellaneous buying of equipment has been done within the past week by the Delaware & Lackawanna Railroad, J. H. Williams & Co., Brooklyn, the Otis Elevator Co., for its Quincy, Ill., plant, and the Dexter Folder Co., for its plant at Pearl River, N.Y.

PIG IRON TRADE

Pig iron is advancing in price, and consumers are having a hard time to secure metal. 1920 iron is being sold at advanced prices. Following are reports from various U. S. centres:

Chicago.—There is a heavy demand for iron, and furnace stocks are being rapidly depleted. Foundry iron for first half is being quoted at \$30 furnace, and malleable at \$30.50 furnace. Malleable and silveries are both scarce, making their position strong.

Boston.—The demand for foundry iron is in excess of the supply, and foundries are taking odd lots, regardless of the analysis. 1,000 tons of No. 2 for first delivery was sold at \$32. High silicon iron for immediate delivery has been sold as high as \$35 Eastern Pennsylvania furnace. Total sales amount to about 7,000 tons, for last quarter and first half.

New York.—Business has been lighter, not because of a decrease of demand, but the difficulty of obtaining iron. Melters have had to pay higher prices for prompt iron, 2.25 to 2.75 silicon brought \$33 Western Pennsylvania furnace. A fair amount of charcoal iron has been sold in this district for first half, and 1,000 tons foundry has been sold to a Japanese buyer.

Pittsburgh.—Furnaces are generally fully sold up for this year, and prices of foundry and malleable continue to mount. Shipments for balance of the year cannot be procured under \$30, and

single car loads are realizing more than that. There is still reluctance in booking 1920 business, until more is known about production costs.

Buffalo.—A sale of 10,000 tons for the first half at \$29.50, Buffalo, has been made, an advance at \$2.25 over former price. A fair quantity of foundry iron has been sold at \$31 to \$34.

Cleveland.—Heavy sales of foundry iron for first half are noted here. One interest has closed business for 100,000 tons in the past two weeks, mostly from first half. Pig iron for immediate delivery is very scarce, and matters are being complicated by difficulty in securing cars.

Philadelphia.—Iron is becoming so scarce that fancy prices are being paid in some cases. No. 2 X has been sold \$33 Eastern Pennsylvania furnace. All Eastern furnaces are sold up for this year. There is a little iron available in Virginia. An Eastern consumer has bought 1,500 tons basic at \$28 delivered. No. 2 X for first half is quoted at \$32 to \$35.

Cincinnati.—Ohio furnaces are now opening their books for first half business. One furnace has booked orders for first quarter of first half at \$29 Ironton, while a second has placed \$29.75 as the minimum for 1920 delivery.

St. Louis.—A large amount of iron in small lots has been sold during the week and the demand is good. There are a good few enquiries coming along for next year delivery. A sale of 25,000 tons basic at Chicago for first quarter delivery has been made at \$25.75 furnace.

BECKER

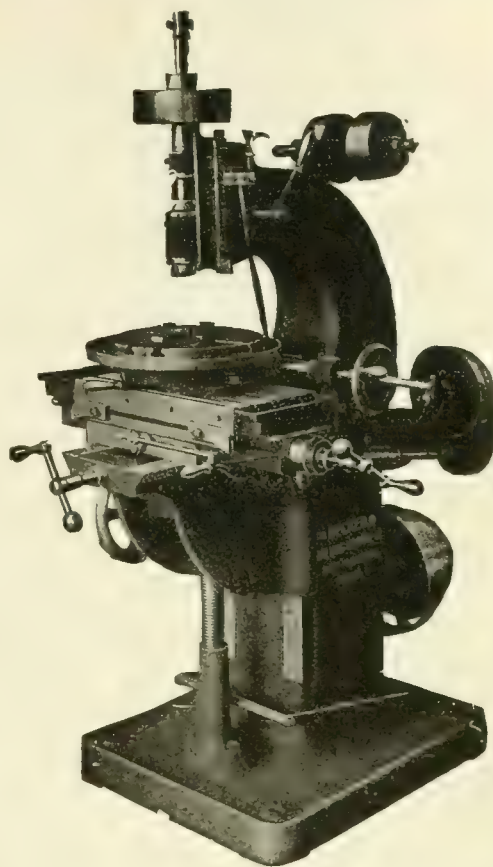
Belt Driven Millers

The Machine that Gives the Smooth Finish

Stringent shortage of labor during the war put a premium on machinery of superior productive ability. Never was the capacity and value of Becker Millers better emphasized than during that period. And Becker Millers will always continue to demonstrate their ability to return maximum production for minimum expenditure of manual effort.

Send us blue prints of your work and other data and we will submit estimates on Becker production. Adopt this "safety-first" course; it may mean added profits to you.

The A. R. Williams Machinery Co.
LIMITED, TORONTO



Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

**The Thos. Davidson Mfg.
Co., Limited**

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492

MORROW

SCREWS

MORROW

MORROW

INGERSOLL

In assembly you should use only the best "Morrow's."

Best Jobbers carry "Morrow's."

Set Screws, Cap Screws—"It's the finishing die that does it."

Nuts (every variety of finish).

Twist Drills, "will do more drilling with less regrinding."

Order Ingersoll Files from us, "They cut faster and wear longer."

John Morrow Screw & Nut Co.

LIMITED

INGERSOLL - CANADA

Always, everywhere, use "Morrow" products. Made just a little better than seems necessary.

MORROW

NUTS

MORROW

U.S. SCRAP METAL

The scrap market is showing more activity lately. Foundry grades and machinery scrap are selling well. The car shortage is interfering with business in some places.

Chicago. With the coming of winter by steel mills the scrap situation has been somewhat quiet. There is an upward movement, and heavy melting and rolling mill material is in good demand. Cast iron scrap is selling above the local pig iron prices.

Boston.—There is a very ready market for heavy scrap, and a price of \$28 is easily obtained, with a few sales at \$28.50. Steel making grades on the other hand are decidedly quiet. Considerable scrap has been offered lately by the war department.

Pittsburgh.—Foundry scrap has been in strong demand recently, and No. 1 cupola scrap has sold at \$25 to \$26 delivered. Better prices than this have been secured on some small lots. Another grade in good request is railroad malleable. Railroads are offering 26,000 tons of scrap steel.

New York. Boiler, turnings and heavy melting steel are still in demand. Heavy melting is quoted at \$15.50 to \$16.00 f.o.b. New York. Clean cast borings have advanced to \$14.50 and machine shop turnings to \$12.

Philadelphia.—There is a good demand for all kinds of scrap, and heavy melting steel has sold at advanced prices. Machine shop trimmings and charcoal iron industry has been buying forge and bundled sheets. Cast scrap is in demand.

Buffalo.—Prices remain the same, but dealers are looking forward to a better market when steel mills get on a normal basis. Heavy melting steel, turnings, borings, malleable and cast are in demand.

Cleveland.—Cast and malleable are in good demand in the Cleveland district, and mills are increasing their production. There is a great shortage of cars. Dealers are holding their scrap and refusing offers above published quotations.

Cincinnati.—There is very little scrap being moved, chiefly on account of the car shortage. Heavy melting steel is in demand, but prices are really nominal transactions, being about \$15.00.

St. Louis.—There is little movement of scrap, but dealers are looking forward to a better market when steel mills get on a normal basis. Heavy melting steel, turnings, borings, malleable and cast are in demand.

There is a sort of poetic justice in the news of the new sphere of activity of the famous German commercial submarine, "Deutschland." The enterprising Mr. H. Bottomley has acquired possession of her from the Admiralty, and she will be exhibited round the British coast, the proceeds of the exhibition to be given to King George's Fund for Sailors. It is worthy of note that her cargo space has a capacity of only 90 tons measurement, and two foot square package was the largest that could be accommodated through her hatches.

plate, borings and shop turnings. Good business is looked for unless the coal strike disturbs things too much.

FIRESTONE PLANT GOES TO HAMILTON

The By-Law Was Carried There by a Very Large Majority

Hamilton: By overwhelming majorities the electors of Barton township carried the by-laws which assures the Firestone Tire and Rubber Co. making Hamilton its headquarters. Under one proposal the company will pay taxes on an assessment of \$100,000 for twenty years, and under the other on an assessment of \$150,000 for twenty years. The full school rate, income and business tax will be paid on all holdings. The vote on the ten-year by-law was 954 in favor and 27 against, the twenty-year by-law 772 in favor, 143 against.

The company has purchased 150 acres east of the city limits on the bay front, including the property owned by Sir Henry Pellatt of Toronto. About two-thirds of it will be used for factory purposes, the first units, on which work will be started at once, employing 2,000 people. The southern part will be devoted to a model town, the company building its own high class houses and encouraging its employees to buy them.

The Jenckes Spinning Co., of Pawtucket, R.I., owners of the largest spinning mills on the American continent, has already declared that it would locate here as soon as the fate of the Firestone by-laws was decided. This company will erect a plant that will give employment to 1,000 people. It is said to be one of the first of a number of companies that will follow the Firestone here.

WILL SPECIALIZE IN FORGING NOW

Sale Made to Ford Co. of Plant for the Making of Fenders, Etc.

An industrial transaction of major importance was consummated in Ford City, Ontario, last week, when the Dominion Forge & Stamping plant was purchased by the Ford Motor Company of Canada. The property in question is situated to the south of the Grand Trunk lines, near the Ford plant. The Dominion Forge & Stamping Company has been engaged in the manufacture of fenders, sheet metal work and frames for the Ford Company.

The purchase of the stamping plant means that the motor car firm will make these parts itself, and will leave the Dominion Forge Company free to make forgings and other parts in its second plant. An inventory of the plant involved in the sale was commenced on Friday last, and it is anticipated that the final valuation will be between \$1,000,000 and \$1,500,000.

Expansion of the forging plant by the Dominion Forge Company to take care of larger requirements will probably be the result of this transaction.

The Dominion Forge & Stamping Co., as the result of the sale of these two stamping plants, will devote their entire interests to the forging business, and will be in a better position to handle any kind of drop forging business to customers' blue prints and specifications. At the present time the firm is practically doubling the capacity of their Board Hammer shop, and is installing a new 8,000 pound steam hammer and a new 5 in. forging machine.

FEAR WORKLESS WINTER IN EAST

New Glasgow People Wait to Hear About Development at Scotia Plant

New Glasgow.—A large mass meeting was held in the Itzbit Theatre to discuss the question of unemployment at the Scotia Steel Works and the Eastern Car Plant.

The situation in New Glasgow and Trenton among workers at these plants has already become acute, and there is fear that a very serious condition will assert itself before many weeks. Both plants are practically without orders and the prospect is that they will be closed down unless relief comes. The men have already held a conference with the management, and the company is prepared to carry the financial end of any orders that may be secured.

At the meeting several of the workmen were outspoken in their demands for work and the danger of want and hunger which their families were facing. Messrs. Alex. McGregor, M.P., was present, but could not hold out any hope of orders from the Government. Hon. R. M. McGregor also spoke and favored a delegation to be sent to Ottawa to press for relief. This course will probably be followed. Already three men have been slated to approach the Government and the directors of the Canadian National Railway asking for car orders, and also orders for next year's railway supplies, such as ties, bolts, spikes, etc.

The men selected are Mayor Wier, of New Glasgow; Mayor Logan, of Trenton, and H. D. Fraser, president of the Federation of Labor organizations. This committee will be supplemented by business representations and proceed to Ottawa in a few days.

There is a sort of poetic justice in the news of the new sphere of activity of the famous German commercial submarine, "Deutschland." The enterprising Mr. H. Bottomley has acquired possession of her from the Admiralty, and she will be exhibited round the British coast, the proceeds of the exhibition to be given to King George's Fund for Sailors. It is worthy of note that her cargo space has a capacity of only 90 tons measurement, and two foot square package was the largest that could be accommodated through her hatches.

Geometric Production

Installing a Geometric Die Head, or other Geometric equipment, has increased production materially in many plants where an increased output was a vital consideration.

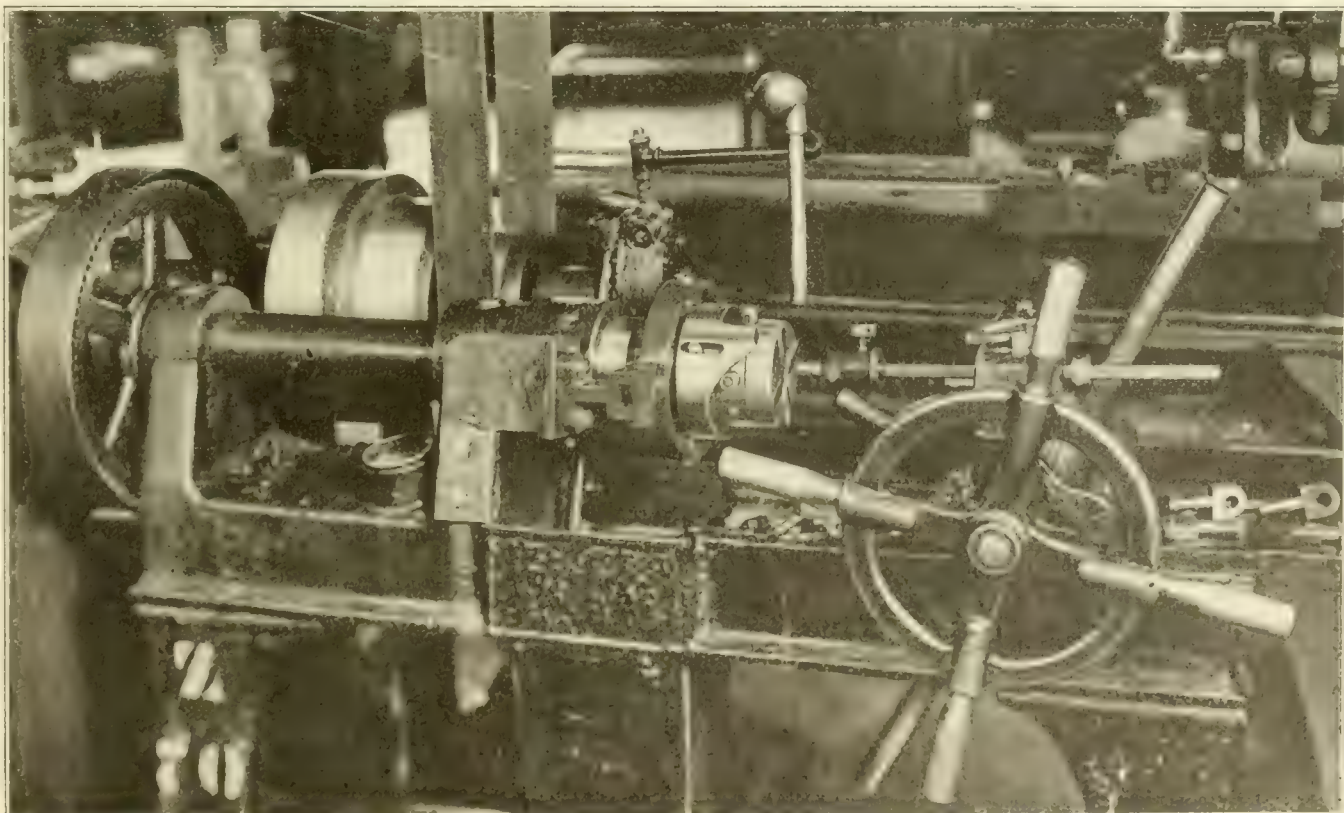
Below is an illustrated instance where a Geometric Die Head (threading machine type) was applied to an old bolt cutter and the production increased six times over what was being done with a solid die head.

Before taking it for granted that you are getting the best possible production on screw threaded parts, let us know what the work is, and we may be able to boost production for you.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

**Williams & Wilson, Ltd., Montreal. The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.
Canadian Fairbanks-Morse Co., Limited, Manitoba, Saskatchewan, Alberta**



If interested tear out this page and place with letters to be answered.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	\$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	\$38 00-40 00
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon, .2.25% to 2.75%	\$32.75 to \$35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	\$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brass steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, 1/4 in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 25
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 Pounds.	C.L.	L.C.L.
Pittsburgh to Following Points			
Montreal	33	45	
St. John, N.B.	41½	55	
Halifax	49	64½	
Toronto	27	39	
Guelph	27	39	
London	27	39	
Windsor	27	39	
Winnipeg	89½	135	

METALS

	Gross	Net
Lake water	\$25 00	\$26 25
Electro copper	24 50	26 00
Castings, copper	24 50	25 00
Tin	58 00	58 00
Galvan	10 00	10 00
Lead	7 75	7 00
Antimony	10 00	10 50
Aluminum	32 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, 1/4 up	\$ 4 50	\$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Butt Weld

% in.	\$	6 00	\$	8 00
1/2 in.	4 68	6 81		
3/4 in.	4 68	6 81		
1 in.	6 21	7 78		
1 1/4 in.	7 82	9 95		
1 1/2 in.	11 56	14 71		
1 3/4 in.	15 54	19 90		
2 in.	19 76	23 76		
2 1/2 in.	25 16	32 01		
3 in.	40 37	51 19		
3 1/2 in.	52 79	66 94		
4 in.	67 16	84 19		

4 in.	79 57	99 74
Standard Lapweld		
2 in.	38 81	35 34
2 1/2 in.	42 12	52 36
3 in.	55 08	68 47
3 1/2 in.	69 00	86 94
4 in.	81 75	103 00
4 1/2 in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8 L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10 L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.	
4 1/2" and larger 50%.	
4" and under, running thread, 30%.	
Standard couplings, 4" and under, 40%.	
4 1/2" and larger, 20%.	

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds.	Montreal	Toronto
Copper, light	\$15 00	\$13 75	
Copper, crucible	18 00	18 00	
Copper, heavy	18 00	18 00	
Copper wire	18 00	18 00	
No. 1 machine composition	16 50	16 75	
New brass cuttings	13 00	10 75	
Red brass cuttings	14 50	14 75	
Yellow brass turnings	9 00	9 00	
Light brass	7 50	7 00	
Medium brass	9 00	7 75	
Scrap zinc	6 00	6 00	
Heavy lead	5 00	5 25	
Tea lead	3 75	3 50	
Aluminum	18 00	18 00	
Heavy melting steel	13 50	13 50	
Boiler plate	13 50	11 00	
Axles (wrought iron)	20 00	20 00	
Rails	14 50	13 50	
Malleable scrap	15 00	17 00	
No. 1 machine cast iron	21 00	18 00	
Pipe, wrought	10 00	5 00	
Car wheels	20 00	20 00	
Steel axles	20 00	20 00	
Mach. shop turnings	6 00	6 00	
Stove plate	15 00	13 00	
Cast boring	7 00	8 00	

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, 3/4" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, 3/4" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27 1/2
Machine screws, o. and fl. hd., steel	10

Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fl. hd., brass	net
Nuts, square blank	add \$0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base 3/4" and larger	\$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77 1/2
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55 1/2
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47 1/2

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1 1/2 in.	40
Fin. and Semi-fin. nuts over 1 1/2 in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1 1/2 in.	add \$1 00
Cold pressed nuts over 1 1/2 in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	\$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	\$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, 3/4 in. and larger	\$7 50
Spikes, 1/4 and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, 1/4-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net
---	-----

Reduces Tap Breakage

Increases Tapping Speed

Attached to any drill press it will tap holes squarely and ten times faster than is possible by hand.

THREADS ARE CLEAN AND SHARP

The action of the Walstrom attachment closely imitates hand tapping, because of the mechanically obtained oscillating movement.

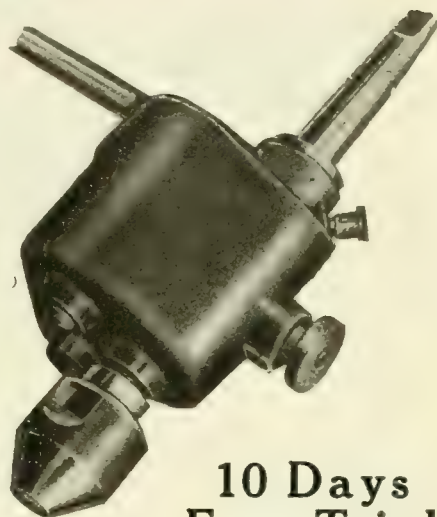
Aikenhead's WALSTROM ATTACHMENT

The quality of material and construction assures a long lasting trouble-free service. Takes taps of all sizes up to 1½ inch.

Send for Bulletin.

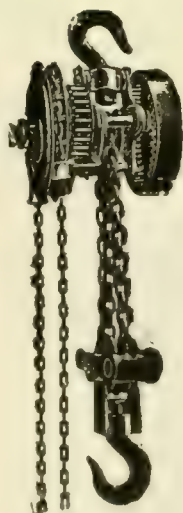
Aikenhead Hardware, Limited

17 Temperance St., Toronto



**10 Days
Free Trial**

Your money promptly re-
funded if unsatisfactory.



Showing the
lower block in
position for reg-
ular or low speed.

Aikenhead's SPEIDEL'S "SIMPEX" Two-Speed Block

The novel feature of the lower block is the simple and ingenious method of securing two speeds, which is of great value where variable loads have to be lifted.

This device is self-disengaging when the load has been hoisted at the fast speed and is lowered below the point from which it has been raised.

This is of great importance and makes this Hoist valuable in connection with cranes and other hoisting machines.

Drop us a line for full information.

AIKENHEAD HARDWARE, LIMITED

17 Temperance St., TORONTO

ILLINOIS

H O B S

CUTTERS

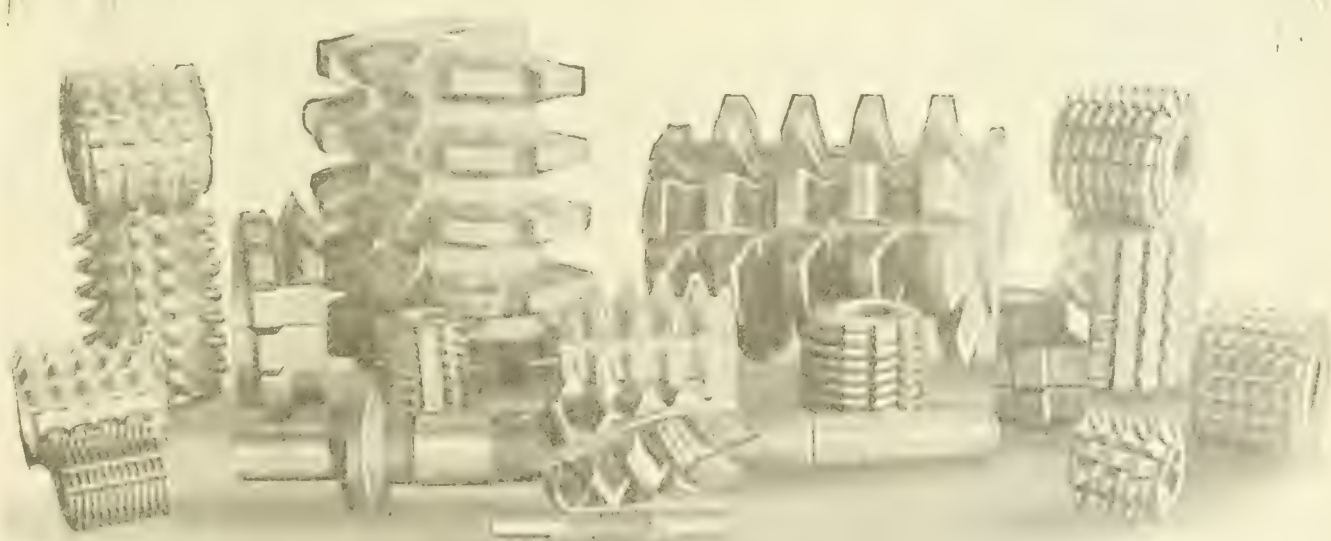
"ILLINOIS" HOBS—
more than high speed tools;
they are the expression
of an ideal of service.



REAMERS

NONE BETTER

CAN BE MADE.



ILLINOIS TOOL WORKS, CHICAGO.

Detroit Store
Woodward and Warren Aves.

A. C. Towne, Inc.,
17 W. Swan St., Buffalo.

New York Office
141-145 West 36th St.

S. J. Pfaff
Pioneer Bldg., St. Paul.

Indianapolis Office
616 Fletcher Sav. & Trust Bldg.

Rose Tool and Supply Co.
111 Market St., Pittsburgh.

Louis G. Henes
75 Fremont St., San Francisco

Title Insurance Building,
Los Angeles.

If interested tear out this page and place with letters to be answered.

MONTREAL NOTES

That steps are being taken to relieve the shortage of coast tonnage is shown in the recent announcement of A. G. Henderson, one of the Atlantic directors of the Canadian American Lines, which he stated that quite a number of vessels were now under construction for the Atlantic trade of his company. In addition to providing increased tonnage for the old trade routes the companies are preparing for other new routes as post-war requirements demand. Mr. Henderson intimated that some of these new boats would probably be ready for the Montreal route for the opening of the season of 1920.

• • •

Further impetus is given to the activities of Canadian interests in the incorporation of the International Corporation of Canada, with head offices at 112 St. Francois Xavier Street, Montreal, with a capital of \$2,000,000. While the primary object of the company is to trade in products made by Canadian manufacturers, the scope of their activities will be world-wide, as it is the intention to establish agencies in all the principal countries of the world, not only to look after the interests of Canada but likewise to develop trade in all parts of the Empire backed entirely by Canadian capital. The gentlemen associated with the company are prominent in Canadian financial and industrial activities, and it is expected that further announcement as to the names of the directors will be made shortly. It is understood that H. B. Thomson, formerly Canadian Food Controller, will occupy an executive position with the new company.

• • •

The practice of coaling Transatlantic steamers on this side, for the return trip, has become additionally pronounced during the past couple of months, owing to the recent unrest in the industrial situation in England. However, this condition will probably be remedied in the near future, as an agreement has been reached between the striking railroad men and the Government, whereby they will return to work while negotiations are carried on. For some time past the congestion of the docks on the other side have become so great that restrictions in shipping have been very necessary. From now on it is expected that relief will be shown in this connection.

• • •

J. W. Macgregor, president of the Canada Steamship Lines, has recently returned from Europe, and is very optimistic regarding the shipping activities, both of this and other countries. He states that British and French shipping interests anticipate a period of increased activity in the near future. Mr. Macgregor is confident that the shipping industry will be able to meet the demand for tonnage. He also stated that the Atlantic route will be able to handle the increased traffic. He further stated that the company is well pleased that they



Sykes in Philadelphia "Public Ledger."

"Sit Down"

portant extensions and improvements are now being contemplated." He looks for considerable emigration from the British Isles to Canada during the coming year, and appreciates the fact that shipbuilding and industry in general will greatly benefit by the additional skilled labor that will be available.

The Halifax Shipyards Limited has just recently completed the rebuilding of the old "Lake Manitoba," which was stranded in the harbor of Montreal about a year ago, and was in consequence eliminated from all shipping registers. The "new ship" will bear the name of the "Iver Heath," and, it is interesting to note that the repairing and reconditioning of this vessel was the second largest repair job ever accomplished on the Western Atlantic seaboard. The boat has just undergone her trial trips, and her actual performance has reflected most credit on the builders, and fully satisfied the group of experts and officials that were on board, and who were watched for any defects to show in the engine room or on or off deck. When the vessel turned over at a speed of 14 1/2 knots the representatives of Lloyd's were so well pleased that they

certified an A-1 classification at Lloyd's. Four other ships of large tonnage are now under construction at these yards, and it is expected that the first of these will be ready for launching about the first of the year. The yard is particularly busy, and about fifteen hundred men are constantly employed.

Some idea of the changing conditions that are taking place in world commerce may be gathered from the export of coal that has recently taken place from this country. While the state of affairs is largely due to this recent attitude of British labor, there is, nevertheless, a possibility that trade of this kind may be permanent in character. The steamer Ariant, recently arrived at Halifax with a general cargo, has been diverted from her regular activities and will take on a cargo of coal at Sydney for the United Kingdom. Another instance of coal trading is the shipments of fuel that are now going to Holland. Some time ago the Netherlands Government obtained some 90,000 tons of Canadian coal, and it has been announced that the Dutch Government are so well pleased with the quality of the coal that a further order for upwards of 200,000 tons has been placed.

A Miniature Hot-Blast Cupola Furnace in Action

This Little Cupola May Look Like a Toy, But It Has Features Which Should be Worthy of Consideration in Full-Sized Foundry Cupolas

Fy F. H. BELL, Editor Canadian Foundryman

THE illustration shown in Fig. 1 is from a photograph of the float which represented the part taken by the Owen Sound Iron Works, Limited, in the Trades procession in honor of the returned soldiers a short time ago.

A story of the procession and the reception given to the returned heroes would make interesting reading, as such stories always do, and any story treating on this subject should be appropriate in any class of magazine, but to

There are lots of furnaces which will not melt continuously for ninety minutes.

Now it is not its size which we will dwell upon so much as its design and the ideas involved. The line sketch shown in Fig. 3 will, perhaps, show more clearly the details of its different features. As will be seen, it is on trunnions and can be swung over on its side for convenience in preparing for the succeeding heat. By this means the workman can do a lot of his work without

shown. The cold blast on entering this jacket has a cooling effect on the inner tube, thereby prolonging the life of the tube, while at the same time absorbing the heat from the tube, and delivering hot air to the tuyeres.

It must be remembered that this hot air is not burned air as every bit of oxygen which the cold air contained is still in it in addition to the numerous heat units, which radiated through the inner tube into the wind chamber.

Now, as we have shown, this is a very small sample of a melting furnace and if a larger one were being constructed, certain changes in the proportions might be found advisable. Characteristic of coke fires in a cupola, the height of the melting zone does not vary in proportion to the size of the furnace, and if the furnace was a large one, projecting up to the second storey of the building, the melting would still be done at the bottom and the zone would not be much higher than in this one. In such a case the inner tube could reach down close to the melting point, and this change would make other possible changes loom up. For instance, the cold blast might be made to enter at the lower part of the belt, where it would be more effective in cooling the



FIG. 1 - FLOAT CARRYING HOT-BLAST CUPOLA, SHOWN IN FIG. 2.

do it justice requires ability beyond that possessed by the writer of this humble narrative. We will therefore refrain from saying much about the reception, suffice to say, Owen Sound did herself nobly, as she always does; the procession alone being of sufficient magnitude to require ninety minutes to pass a given point.

As we have already said, the float shown in the illustration is that of the Owen Sound Iron Works, of which Mr. James Higham is the foundry foreman. On the wagon will be seen the little cupola shown in Fig. 2, and it is of this little cupola that we wish to speak.

This cupola is the invention of Mr. Higham, and to show that it is no toy we might explain that Mr. Higham had it in blast all through the procession and had men making moulds and pouring them with metal taken from this cupola.

Dimensions of Cupola

From the sand bottom to the top it is 36 inches and the outside diameter is 12 inches, inside diameter 8 inches. It has two tuyeres, each 1½ inches in diam. It is small, but can and does melt iron, and as Mr. Higham says, it is because it is a hot blast furnace. The tuyeres never get bunged up, because the slag slips right past them.

working in the dust and draught. This feature can be adopted on the largest-sized cupolas and can be tipped by mechanical means. But this is only one of its minor characteristics, the main point being the blast arrangement.

As is well known, every cupola has what is known as the melting zone above which iron does not readily melt, and cast iron blocks have frequently been used to good advantage instead of bricks in this part of the lining, standing the abrasive action of the descending iron and fuel better than fire bricks. But of course every part of the cupola is hot, and while this part of the lining does not get hot enough to melt and run down, it gets near to it and in time it burns out.

In the furnace here shown the lining above the melting zone consists of a one-piece cast iron pipe of the proper inside diameter. This pipe is flanged at the top to fit the inside of the shell. The bottom of the pipe rests on top of the ganister lining of the melting zone, which zone would, in a larger furnace, of course, be bricked up with fire bricks. This makes the entire furnace above the melting zone a continuous hollow jacket. The blast pipe connects to this as shown in the illustrations, and from this to the tuyeres by outside pipes, also

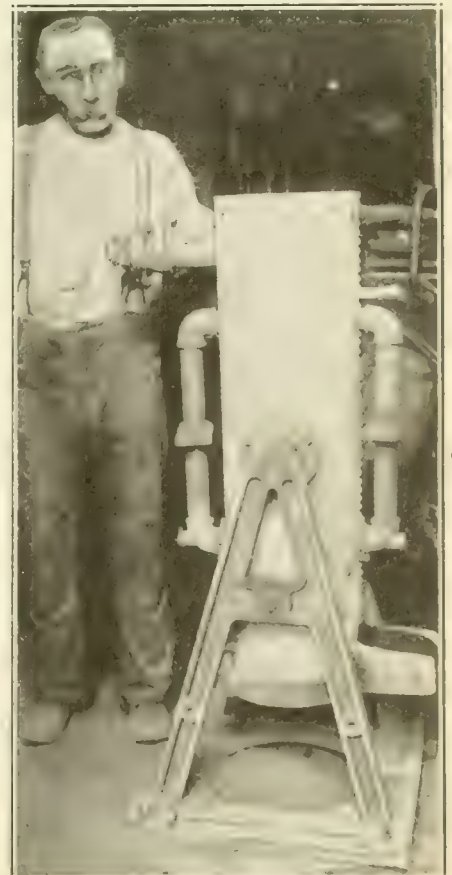


FIG. 2 - HOT-BLAST CUPOLA.

inner tube where it most required it and also where it would absorb more heat from the inner tube. It might also be advisable to have the pipes leading to the tuyeres connect at the top, where the heated air is most likely to be. But

Mr. Higham, has all of these points thought out. He has some notion of presenting this one to the Owen Sound Technical School, and building a somewhat larger one for Labor Day celebrations, etc.

Mr. Higham is a native of Stockport, Cheshire, England, and some years ago operated a foundry at Levenshulme, near Manchester, and it was there that he worked out his idea of adopting hot air to cupola practice.

Iron and Steel in Occupied Germany

FROM April 1918 to May 1919 a Commission appointed by the Ministry of Munitions, and composed of Sir W. J. Jones (Ministry of Munitions), Mr. P. S. Cooper (the Partington Iron and Steel Company), Mr. R. C. Harding (Robert Heath and Sons), and Mr. Cosmo John (Vickers, Limited), visited certain steel works in Lorraine and Saar Valley with a view to reporting upon the developments which had occurred at the works during the war, the present conditions of their plant and machinery, the prospects of the works acting as competitors with British industries, and the developments in fuel economy practised at them.

While the iron and steel works of the Saar Valley worked at high pressure throughout the war, those in Lorraine suffered severely from lack of fuel, and had, especially towards the end, to be damped or closed down for several weeks on end from this cause. Lubricants also gave out towards the close of hostilities, and in some instances both in Lorraine and the Saar Valley serious damage was caused to machinery as a result. In spite of the confident assertions of the German Press, no satisfactory substitute for manganese seems to have been found by the steel makers. Calcium carbide in conjunction with reduced quantities of manganese was employed, but at only one works did the Commission receive assurance that its use was at all satisfactory. At others testimony was received indicating that it gave very bad results, as much as 30 per cent. of the steel produced with it being scrap. Powdered anthracite was used as an alternative de-oxidizer, but was not a success.

The damage suffered by the steel works from bombs appears to have been slight. The Hagondange—formerly Hoeslitz—works received 400 bombs, and the works at Hayange 150. Nevertheless, the total damage was estimated at but £5,000, while the loss of production was comparatively slight. Signs were, however, found that the moral effect was considerable.

Dealing with present conditions, the Commission reports that the shortage of furnace coke is severely restricting the output of the blast furnaces, and consequently of the steel works, which in all cases are the chief type of metal. The Commission found that in Lorraine the shortage of coke is due to the fact that the coal is of a low quality, and that the coke is of a low quality. Up to the present, however, the Germans

have failed to provide the fuel in the amount specified under the Armistice terms. In the Saar Valley the works are less dependent upon Westphalian fuel, but it is necessary to mix Westphalian coal with Saar coal in order to obtain a good furnace coke.

There are 68 blast-furnaces in the province of Lorraine. Of these 60 were in good condition at the date of the armistice, although only 5 were in blast. Since then as many as 27 or 28 have been simultaneously in blast under the French authorities, but at the time of the Commission's visit the number running was less, and those which were at work were on short blast owing to the scarcity of fuel.

Under the terms of the armistice the Germans were required to deliver 13,700 tons of suitable furnace coke per day. During November and December very little was handed over. In January the deliveries averaged between 5,000 and 6,000 tons per day, but in February and March they fell to between 2,000 and 3,000 tons. Since then the quantity delivered has been negligible. Altogether, instead of 1,500,000 tons, they had delivered at the date of the Commission's visit only about 500,000 tons.

There is no shortage of labor at present, but to prevent unrest the French authorities are paying the workmen full wages during their periods of partial or complete idleness. At the date of the armistice there were approximately as many Germans as Lorrainers employed at the Lorraine iron and steel works. Certain Germans have been sent back to Germany, but for the most part those who remain have no desire to leave. They wish to become French subjects; they are not troublesome, and agree with the French element.

In Lorraine all the iron ore used is obtained from local deposits, being generally brought by aerial rope-way from the mines, which in no case are farther than 11 miles from the works. The ores are of two qualities, calcareous and silicious, and are used jointly to give a self-fluxing mixture. The ores are phosphoric, and the pig iron produced at the blast furnaces is nearly all used for making basic Bessemer steel, their being generally a steel works attached to the blast furnaces. The blast furnace gases are extensively used for driving the works and plant. Generally speaking, the gases are first roughly cleaned and then in part used in the heating stoves of the blast furnaces and under

steam boilers. The remaining portion is further cleaned, and is employed in large two-cycle gas engines driving the blowers and in four-cycle gas engines driving the rolling mills, etc. Electric driving of the mills is used in few cases, but the advantage, according to the Commissioners, seems to be less in practice than in theory.

The blast furnaces are in nearly all cases built of brick and banded, very few having steel shells. They are lower and their hearth areas are larger than would be the case in this country for similar outputs, and are only driven at very moderate rates considering the size of the hearths. Only one case was found in which the rate of combustion of coke exceeded 200 lb. per square foot of hearth area per hour. At nearly every works visited plant for producing slag bricks was found. The slag is granulated by being run molten into water. The granulated material, with about 5 per cent. of lime added as a binder, is allowed to rest for 24 hours and is then formed into bricks in machine presses, each of which is capable of turning out 10,000 bricks per day. At some of the steel works a slag cement plant has been laid down.

A feature of the works in general visited by the Commission was the large size and good arrangement of the stock yards. It would appear that the steel works execute a large number of orders from stock, and thus act as their own warehousemen. At one works as much as 27,000 tons of steel were found in stock, while at another 15,000 tons was stated to be the normal quantity held.

As a consequence of the large demand for electrolytic copper during the war, the price advanced very greatly and many concerns for manufacturing this product were opened in Japan. The raw material for this industry was obtained from the Chinese bronze coin, which was imported into the country in large quantities until the Chinese Government prohibited its exportation. At present the prices of electrolytic and ordinary copper varies so slightly that it does not pay to manufacture the former. Copper sheet manufacturers are also hard hit by the decline in prices and some of the large concerns are suspending operations or giving up this branch of business.

UNIFLOW LOCOMOTIVES

The Uniflow type of engine cylinder has been applied with considerable success in England to locomotive design. The accompanying illustrations show the design developed by the North-Eastern Railway at the Darlington works. Three cylinders are installed, each of them 16½ in. dia. by 26 in. stroke. The design of these and their difference in appear-

with spring rings at each end, which prevent any steam passing through to its other side. It is claimed that this piston, being hollow and full of air, protects the live steam of the piston from the disadvantageous effects, which the ordinary narrow piston possesses, due to its being a single solid surface, one side or the other of which is always wet from exhaust steam.

which will be obtainable from the secretary of the Association of British Driving Chain Manufacturers; Bassishaw House, Basinghall street, London, E.C. The association comprises the following well-known firms: Alfred Appleby, Ltd., Birmingham; Brampton Bros., Ltd., Birmingham; "The Coventry" Chain Co., Coventry; Perry & Co., Ltd., Birmingham; Hans Renold, Ltd., Manchester.

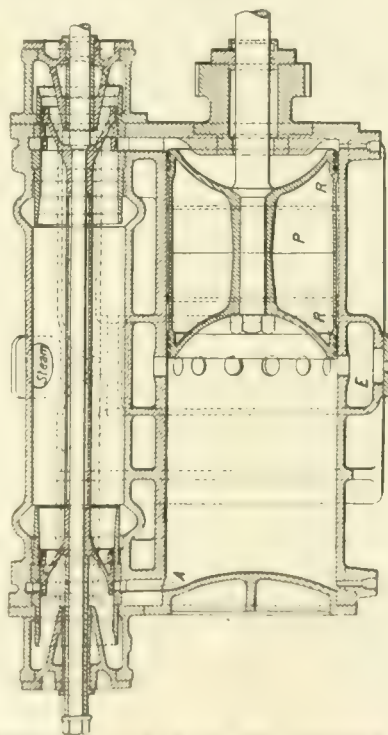


ENGLISH UNIFLOW LOCOMOTIVE

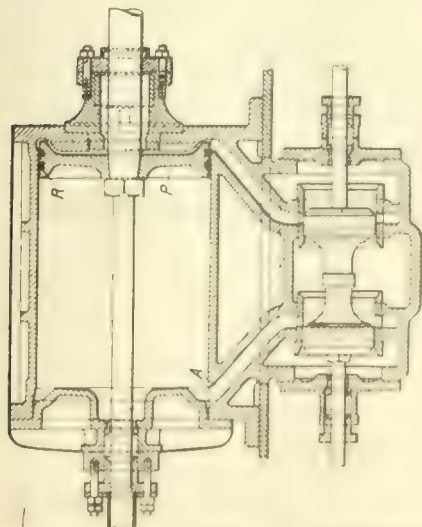
ance from the ordinary piston valve cylinder may be seen in the line drawing.

The "Uniflow" principle differs from that of an ordinary cylinder in that the steam entering at one port does not have to return to the same point, but escapes through an exhaust port provided in the middle of the cylinder barrel. The steam, therefore, has only a forward and no backward movement; hence the term "Uniflow." Owing to the fact that the exhaust is in the middle, it is necessary to increase the length of the cylinder to about double what it would otherwise be, in order to allow the steam which enters through the port at one end of the cylinder to press forward the piston for the same length of time or distance before exhaust, as is done in the case of the ordinary engine. The piston in a "Uniflow" cylinder is called upon to govern the exhaust instead of, as in the usual type, leaving that function to the slide or piston valve. The piston is a hollow casting,

We are indebted to the North-Eastern Railway Magazine for the information contained in this article.



SECTIONAL DRAWING OF UNIFLOW CYLINDER



SECTIONAL DRAWING OF ORDINARY CYLINDER.

Standardization of Roller Chains—The Association of British Driving Chain Manufacturers announce that they have now completed the standardization of roller chains up to 3¼ in. pitch. For the convenience of chain users, and to insure complete interchangeability they have also standardized chain wheel tooth forms. These new tooth forms, while not being identical with any of the existing forms, incorporate the essential features of each. Particulars of the standards set up by the Association of British Driving Chain Manufacturers are to be published in pamphlet form

The John H. Hall & Sons, Ltd., Brantford, Ont., have issued a very attractive catalogue on their complete lines of pipe lathes, rapid nipple machines and roller pipe cutters.

The cover of this catalogue is a novelty in itself. The already well-known wheel trade mark is stamped out in such a manner as to show the five members of the concern, including the founder, J. H. Hall, who recently passed away. In addition to the regular catalogue, material, repair charts, and instructions for the operator of machines is included. Data on the care of dies for such machines is given, which is exceedingly valuable, for, as a rule this question does not receive the care it deserves.

Taken in all, this catalogue is well worth having to anyone interested in these lines.

In "La Nature" an account is given of an automatic regulator for low-temperature electric furnaces, the invention of which is ascribed to M. Lequeux, whereby the temperature is accurately controlled. The device consists of a glass tube inclined at 30 deg., and connected at its upper end with a vessel containing a fluid which undergoes considerable dilation under the action of heat. The lower end of the tube connects with a vertical cylinder containing mercury in which is an adjustable piston. In the sloping tube, where the mercury enters up to a certain height, are spaced platinum contacts connected with points on the coil of a rheostat. The device is placed in the furnace, and when the latter is cold the platinum points are short-circuited by the mercury. The furnace, therefore, receives the full current. With a rise in temperature the liquid in the upper vessel expands and forces down the mercury, thus putting into circuit a succession of the various sections of the rheostat connected to the platinum points and diminishing the current. The device is intended primarily for laboratory furnaces heated by electricity, but the same principle may be applied to other forms of apparatus so heated.

"You don't mean to tell me you ever doubt the wisdom of the majority?"

"Well," responded Senator Sorghum with deliberation, "what is a majority? In many instances it is only a large number of people who have got tired out trying to think for themselves and have decided to accept somebody else's opinion."—Washington Star.

MAKING STEEL IN CANADA

Continued from page 464

eight hundred pounds (800 lbs.) of coal, each pound of coal makes about sixty (60) cubic feet of gas (at 60° F.)

The great advantage of gas as a fuel lies in the fact that a low grade of coal can be used, that coal and ashes can be mechanically handled, and the gas and air heated before combustion takes place.

We have now followed the iron ore from its hiding place in the depths of the earth through the blast furnace where the major portion of its impurities are purged away, through the open hearth furnace where the refining is carried still further, and we now have ingots of steel weighing from three thousand (3,000) to eight thousand (8,000) pounds each. Before rolling, these ingots have to be heated in either a soaking pit furnace or a continuous heating furnace. They are then rolled, first in a mill, called a Blooming Mill, which reduces them from ingots of, say, sixteen inches (16 ins.) square to blooms 6 ins. x 6 ins. square. These blooms are then re-heated and rolled into billets, and the billets in turn rolled to the various bars required.

In the cast of steel plates, the ingots are cast in the form of a slab and worked between plain rolls until the desired size and length is obtained. Large structural members as "H" beams and "I" beams are rolled from an ingot cast roughly to the contours of the beam.

The original mills with simple stands of rolls and the bars had to be placed between them and lifted from one pass to the other by man-power. Modern mills are provided with tables of all descriptions to eliminate this hand work and secure immense outputs.

THE GREAT LAKES SEASONS

Continued from Page 475

ashore, receiving damage to the extent of almost half a million dollars. The vessels lost and stranded were of all sizes, from 2,800 tons d.w. to 10,000 tons d.w., and besides the distinctive lake type of carrier, included vessels of the tramp type. These were built in Great Britain, fit and seaworthy to navigate any waters that would float them. Eight of the vessels disappeared totally, among them, being the "Wexford," a British-built ocean-going tramp. The

"Charles S. Price," a 9,000 ton lake carrier, was found after the storm floating bottom up, with her bow end out of water. Later she, too, sank completely.

The wind at its maximum attained a velocity of 79 miles an hour, and averaged 60 miles an hour, and raised such a sea as has, perhaps, never been raised on the lakes before or since. Vessels running before the wind were continually pooped, the seas filling the engine room, and smashing every deck erection in its path. Those headed into it found it impossible to keep their vessels head up, and they gradually fell off into the trough, where they were pounded by the heavy seas till they foundered, or were driven ashore and smashed to pieces.

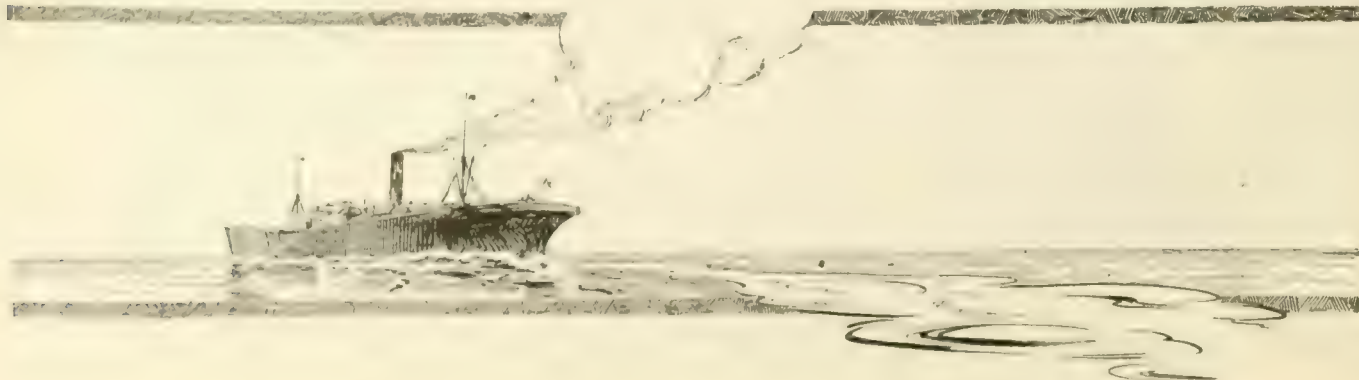
That gale will live long in the memory of Lake sailors, and the inhabitants of the towns and villages of the lake shores. It ranks among the great marine disasters of the world, and it is to be hoped that the inland waters will never suffer such another catastrophe.

At the time this happened, much speculation was rife among the uninformed, and among many that should have known better, as to why these ships could not survive a heavy blow. Salt water men pointed out that the British-built tramp did not founder, but was driven ashore, a very different happening. They claim that had the vessel had sea room, she could have lived through any gale. This is practically true.

The answer of the lake sailor is that their vessels are not intended or built to stand such conditions. They are built for carrying a heavy bulk cargo on the least possible draught. They have the reports of a capable weather bureau to guide them, and if bad weather threatens, they remain in port. If on their voyage, and conditions become adverse, they can usually gain shelter. They point out that the percentage of loss to total traffic is decidedly low, but when a loss occurs it is usually of a spectacular character, which focuses attention on it. It practically amounts to the fact that a lake carrier, caught in a heavy storm, stands a good chance of being lost. On the other hand, an ocean-going vessel takes storm and calm all in the day's work, and unless close on a dead lee shore, does not worry much.

If the two types of vessel are studied a little, the reason is apparent. Take two vessels of the same tonnage, one an ocean-going vessel, and the other a bulk carrier of the lake type. A 10,000 ton d.w. ocean-going steamer will have dimensions of approximately 450 feet long by 56 feet beam by 38 feet deep. She will have engines developing 4,000 h.p. The lake carrier of the same size will be 524 feet long by 54 feet beam by 30 feet deep. Here is a great difference. Her engines will be only 2,200 h.p. A greater difference still. The ocean-going steamer has her engines and boilers amidships, and in the bottom, and light or loaded, trims on a practically even keel. The lake boat, on the other hand, has her engines right aft, and the boilers usually set in the 'tween deck. She trims by the stern, and when running light, there is a difference of 10 or 12 feet between the draught aft and forward. Now, what are the conditions of the two vessels in the same waters, and the same weather? The ocean-going ship, full loaded, will be drawing about 29 ft. She has ample power, and steers well. The lake boat will be drawing roughly about 19 or 20 feet. It is at once apparent that of the two vessels the ocean-going steamer is easier to handle. The extra length, less draught, and low power of the lake steamer makes her, in severe weather, almost unmanageable. In very severe weather she becomes helpless. Then again the sea that runs on the lakes is very high, with short intervals between the waves. These seas break very quickly, and the effect is a series of hammer-like blows delivered unceasingly. The fabric cannot resist it if long continued. Now, in open water the seas are long, and a vessel has time to rise and fall to them. Very rarely does the bulk of the sea break on a vessel. It is usually just the crest of the sea that falls on the deck. When a vessel does get under the weight of a real Atlantic roller, she comes into port with her upper works levelled to the deck, and a story of a tidal wave.

I have tried to show in this limited space what the mariners of the Great Lakes have to contend with. As a salt water man, I feel a deep respect for them and their work, and would like to see Canadians in general take a deeper interest in this phase of their national life.



ONE SHORT YEAR AGO

Go back a year—in memory.

Then we **hoped** to win.

We believed we would win.

We were willing to spend every cent in Toronto for Victory. Every man, woman and child in Toronto was prepared to pay any price if only we could achieve Victory.

Now Victory is ours—Complete and decisive Victory.

If you were asked to **give** to the Victory Loan 1919, you should do it in thankfulness for Victory.

But you are not asked to give—only to **lend** your money.

—On the best security in the world.

—At a good rate of interest.

If every citizen of Toronto will make it his duty to support to the utmost of his ability the Victory Loan 1919, we can gain such a reputation for Toronto as will astonish all Canada.

The money is here.

Why not make this a record?

ALL TOGETHER NOW BUY VICTORY BONDS

This Space Donated to the Victory Loan 1919 Campaign by

GARLOCK-WALKER MACHINERY COMPANY, LIMITED

Montreal

32 Front Street West, TORONTO

Winnipeg

STEEL MAKING IS GOING AHEAD NOW

Work at Sydney Commences After a
Shut-Down Lasting for Some
Weeks

Sydney.—Steel making is once more in progress at Sydney Mines. After a shut-down of three and a half months, a portion of the open hearth furnaces of the Nova Scotia Steel and Coal Company are once again producing ingots. The re-lining of the blast furnace has just been completed, and steel officials expect to have the furnace blown in within the next few days. Under the most favorable conditions it takes several days to relight a furnace and produce a cast, but it is not the intention of the officials to force a quick cast, as the new lining is to be given every chance to become gradually accustomed to the increasing heat pressure. The blast furnace and open hearth furnaces were closed down about the first of July and have been under repairs ever since then. The first ingots since that date were produced a few days ago. As far as could be learned winter prospects at the Scotia plant during the coming winter are fairly bright. This seems to be particularly true as regards the steel industry. The company, it is understood, have some fairly large orders in view, but have not yet closed with them. Negotiations are in progress, and

unless some unforeseen obstacle arises, the contracts will shortly be completed. The situation at the collieries of this company seems to be somewhat uncertain at present. Just now three of the four collieries of the company are working every day, while the other, the Jubilee, operates from three to four days per week. Whether this situation will continue indefinitely will depend largely on market conditions.

CATALOGUES

Paul O. Abbe, 30 Broad St., New York City, have issued a condensed catalogue (F), listing specialties such as ball and pebble mills, rotary cutters, meat mills, hammer mills, bolting reels and mixers. Bolting cloth, grinders and vacuum pumps are also listed.

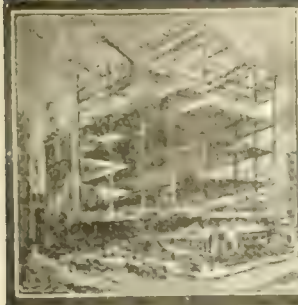
The W. S. Rockwell Co., 50 Church St., New York, have issued a very useful steel heat-treatment chart, on which is given valuable data to anyone interested in this subject. We are informed that they will forward one of these charts to those interested upon request.

J. H. Williams & Co., makers of superior drop-forgings and drop-forged tools, with works at Brooklyn and Buffalo, N.Y., have just issued a catalogue, 116 pages, fully illustrating and describing their standard stock specialties. These include several lines of drop tools, viz. "Agrippa" turning-

tool holders, set-screw pattern; "Agrippa" boring-tool posts; "Vulcan" forged-cutter tool holders, and several new assortments or sets of drop-forged wrenches.

The book contains, also, a description of the drop-forging process in very simple, non-technical style for the benefit of those not conversant with its details.

Plate Next Year.—After completing a tour of inspection of his company's properties, President Mark Workman of the Dominion Steel Corporation has returned to Montreal. Mr. Workman states that some of the furnaces at Sydney have resumed operations. With the completion of the new ship plate mill, which will probably become a producer early in the new year, an additional demand will be made on the furnaces. "The demand for steel products," said Mr. Workman, "is improving. There is, also, an urgent need for coal the world over, and it is this branch of our operations on which we are now concentrating our attention. With our unequalled loading facilities at four ports on the Atlantic seaboard, we are in an exceptionally advantageous position to take care of export and bunker coal requirements, and we are bending every effort toward raising our output to its normal level, in order that we may meet the conditions to the largest possible extent."



INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



PERSONALS

A visitor from London, England, says: Roger Beck, director of Baldwin's, the great Welsh iron, steel and coal firm, sails for Canada this week to inspect the big Toronto business, recently acquired by the firm and from which much is expected. It is a coincidence that Lady Rhondda, daughter of the late Viscount Rhondda, is in Canada on business connected with the working of mineral properties purchased by her father.

Mr. P. J. Melvin has joined the staff of the Marine Navigation Company of Canada, Ltd., where he will take charge of all matters connected with the booking and loading of cargo for this company. His headquarters will be in Montreal. Mr. Melvin has been for a considerable period in the employ of the Canadian Pacific Railway as export freight

OBITUARY

The death occurred recently at Montreal of Mr. John Critchley, formerly a well-known building contractor of Toronto. Mr. Critchley had large mining, lumbering and other interests in Northern Ontario. He was secretary of the Public School Board, a prominent Liberal, Mason, and member of the Anglican Church.

Mr. Cowan, well known as a railway construction contractor, died suddenly after addressing a meeting of his supporters in the election campaign recently. Mr. Cowan was 68 years of age, and owned a large farm on the outskirts of Cannington, Ont. He is survived by a widow, one son and one daughter.

Mr. Barry Smith of the Dominion Construction Company, Toronto, met his death at Parry Sound under unusual circumstances. Mr. Smith was resident engineer on concrete construction in this district for the C.N.R., and was traveling in the conductor's van of a construction train when it was wrecked. Fire broke out and Mr. Smith was fatally burned.

Duncan McD. Campbell, formerly assistant city engineer of Halifax, and engineer on the staff of the Nova Scotia Highway Board, died at his home after an illness of several years. Mr. Campbell was a native of Truro.

Mr. James Low, a prominent contractor of Ottawa, was drowned through falling into the Rideau Canal recently.

The death occurred at St. John's Hospital, Buffalo, of Capt. Clinton G. Innes. Deceased was one of the oldest and best known captains on the Great Lakes. He was 74 years of age, and had sailed the lakes since boyhood. For many years he was in command of steamers of the Pittsburgh Steamship Company. His last boat was the steamer H. H. Rogers of that fleet.

MARINE

Buffalo.—The bow of the steamer "Northland," which has been cut in two at the yard of the Cowles Shipyard, is now ready to leave Buffalo for Levis, Quebec. The Northland has been purchased by the Davey Shipbuilding Co., of Levis, which company purchased the bow end of the Northwest. The stern end of the Northland will be ready to leave very soon after the bow.

Detroit.—The United States Shipping Board have sold the steamers "Seneca" and "Bethlehem" to Great Lakes owners. The steamers will be delivered at Boston. The Seneca has arrived at Boston, and the Bethlehem will leave Portland for Boston as soon as she is discharged. The new owners are in Boston awaiting the vessels.

Cleveland.—There is very little shipment of grain, and most of the ore shippers are cleaned up. There may be better movement of grain at the beginning of the month, but many boats are being tied up. Several steamers have taken short cargoes during the week. Cold weather at the head of the lakes had the effect of delaying ore shipments, as the ore was frozen, and had to be thawed out before loading.

Guernsey.—At the entrance to the Russell Channel leading to St. Peters Port, Guernsey, Channel Islands, a lighthouse has been erected which is entirely controlled from the shore by means of a cable about 1½ miles long. This cable is of very strong construction, and carries current to control the light, and also the foghorn. The horn has been heard on the French coast 34 miles away. The lighthouse is called the Platte Fougere.

Toronto.—The old "Chicora," one of the most interesting vessels on the Great Lakes, foundered at her moorings

at the foot of Cherry Street, through a leak of some sort. It is surmised that the packing may have got out of one of the seacocks, or something of that nature. The water came in faster than the pumps of the salvage boats, hastily summoned, could remove it, and she sank, snapping her mooring ropes as she went down. She will be removed.

Ottawa.—Up to date 15 ships have been delivered to the Canadian Government Merchant Marine, and are in service. There have been 25 sailings, and the tonnage carried aggregates 116,000 tons.

Bridgeburg.—The Canadian Allis-Chalmers have completed the steamers "War Magic" and "War Vixen," and they will have their trial trips at once. The yard has been working overtime in order to complete the vessels before the close of navigation. They are the standard 2,500 tons size built for the Imperial Munitions Board. There are two other vessels on the ways.

Grimsby.—A dredge that was being towed from Grimsby by the tug St. Paul, broke away from the tug during heavy weather, and sank almost immediately. Here the crew were taken off, but one man named John McLaughlin, was taken down by the craft and drowned. Two scows which were in tow were washed ashore later. They carried no crew.

TRADE GOSSIP

Natco to Enlarge Plant.—The National Automatic Tool Company of Richmond, Indiana, manufacturers of multi-drillers, have placed a contract for a new addition to their plant, which will be of steel and brick construction, and will be equipped with the most modern machinery. It has only been three years since the "Natco" doubled their capacity by enlarging their plant, but the increased demand for Natco multi-drillers, both domestic and foreign, necessitates this additional building, which will enable them to again double their capacity.

Textile Machinery Plant for Hamilton.—The Jenckes Machine Company of Pawtucket, R. I., are to build a plant in Hamilton that will employ 1,000 hands. The Jenckes Company is said to be the largest firm in the United States manufacturing textile machinery. Their locating in Hamilton is contingent on the Firestone Tire and Rubber Company ob-

taining the concessions they are asking off the town, as the plant of the Firestone Company would be employed in making the machinery for the Firestone Company in the first instance.

Doing Quick Work.—Although the Ontario Steel Products received a severe blow in the burning of the company's plant at Chatham in the beginning of September, the energy of officials has to a large extent overcome the disadvantages of the situation, and in a very short time the company will be operating at 50 per cent. of capacity in a new building erected on the site of the old. Furthermore, advantage was taken of the destruction of the old factory to construct a modern fireproof structure, which will insure the company against unfortunate occurrences of a similar nature in the future. The shape of the new building will be somewhat different to that of the old, permitting centralization of operations and producing greater economies in manufacture. In this, they were assisted by the fortunate circumstance that, at the time of the fire, a new plant had been planned for Oshawa, after careful consideration had been given to all details. In consequence of this, a contract for the new plant at Chatham was let within a couple of days of the fire and building operations were immediately proceeded with. Already the plant has sufficiently progressed to permit certain operations to be carried on, and within a fortnight or so it will be operating at 50 per cent. of capacity. The company has more orders on its books than it can attend to for months to come, and, in spite of the interruption will, it is declared, have a good year.

Truck Factory Coming.—Towns in the Niagara district are competing with each other to secure a two-million dollar truck factory, which it is purposed to erect in Canada. This will be a branch of a large American factory with headquarters in Brazil, Ind. Bridgeburg men own some of the stock, and the Industrial Commissioner of Welland is endeavoring to land the industry for his town.

Competition For New Factories.—The town of Guelph is anxious to get new industries, but is not able to put up the inducements that Brantford is offering. Three of the firms which are negotiating with Guelph have announced their willingness to locate there if the same concessions are offered as at Brantford. Brantford offers to build a new factory, charging the firm a rental of \$8 per cent. on the total cost of the building, and giving the firm the right to purchase in five or ten years at actual cost. The firm offering these concessions has its bonds guaranteed by the town of Brantford. Guelph cannot offer any such conditions.

Department of Labor Statistics.—The returns from the Provincial and Dominion offices of the Employment Service show a decrease in the number of placements compared with the returns of the

"Star Brand" Seamless Brass and Copper Tubes

Including
Iron Pipe Sizes

also

**Seamless Brass
Condenser Tubes**
*Ready for Immediate
Shipment*

from our

NEW YORK WAREHOUSE

Also a complete line of Mechanical, Cold Drawn
Seamless Steel Tubing

**U. T. HUNGERFORD
BRASS & COPPER CO.**

Lafayette, White & Franklin Sts.
NEW YORK, U.S.A.

previous week. 8,222 persons had been referred to regular positions, and of these 6,949 received employment (1,294 casual jobs were supplied. During the week 9,097 applicants were registered, of whom 610 were women. Vacancies totalled 9,174, of which 705 were for women. The number of soldiers placed was 2,670, or 38.4 per cent. of the total regular employment placements.

Trade With the Orient.—There is a good opening for profitable trade with the Orient, but Canada is not pushing this to the same extent as the U. S., according to Mr. Gilchrist, a prominent Vancouver man, who has just returned from a trip to China. He said a big concern was being formed in China and was now ready to establish a passenger steam line to Vancouver from Chinese ports.

Plenty of Coal in London.—London has more bituminous coal than she needs, according to Mr. A. M. Heaman, a leading coal dealer of that city. He said the same condition applied all over Western Ontario. A considerable portion of this coal was left over from last year.

Belleville Goes After Industries.—An industrial corporation has been formed in Belleville with a capital of \$200,000 to aid and finance manufacturing enterprises that locate in the district. An attempt is being made to attract business by tempting locating in Belleville, and a number of Belleville men were agreeable to taking stock in the company.

Chemical Industry for Vancouver Is Laid.—An industrial corporation has been formed in Vancouver with a capital of \$200,000 to aid and finance manufacturing enterprises that locate in the district. An attempt is being made to attract business by tempting locating in Vancouver, and a number of Vancouver men were agreeable to taking stock in the company.



PATENT ATTORNEYS

RESEARCH BUREAU

REPORTS BY EXPERTS ON SCIENTIFIC, TECHNICAL AND INDUSTRIAL DEVELOPMENT.

SPECIAL RESEARCHES ARRANGED.

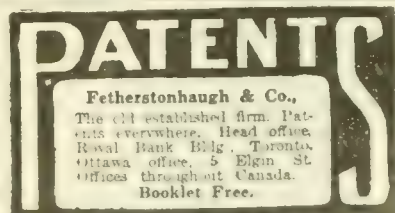
PATENTS, TRADE MARKS, ETC.

HANBURY A. BUDDEN

CABLE ADDRESS

112 DRUMMOND BLDG., MONTREAL

"BREVER"



Fetherstonhaugh & Co.,

The old established firm. Patents everywhere. Head office, Royal Bank Bldg., Toronto. Ottawa office, 5 Elgin St. Offices throughout Canada. Booklet Free.

PATENTS TRADE-MARKS AND DESIGNS

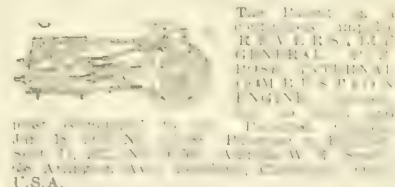
PROCURED IN ALL COUNTRIES

Special Attention given to Patent Litigation

Pamphlet sent free on application

RIDOUT & MAYBEE Kent Bldg., Yonge St.
TORONTO, CANADA


For Sale or License



Independent of the German supply.

Trade Fair for Britain.—A trade fair to be held simultaneously in London, Birmingham and Glasgow, lasting for a fortnight, is being organized by the Board of Trade. It will be the greatest ever held in the British Empire, and over a hundred thousand invitations will be issued. Only manufacturing firms in the Empire will be allowed to compete. The Crystal Palace will be used for the London fair.

Co-operative Shipbuilding.—At a Board of Trade meeting in Victoria the president of the G.W.V.A. made the statement that the shipyard workers would put up \$350,000 if the business men would contribute \$500,000 to ensure the continuance of wooden shipbuilding. A representative of the Cholberg firm called attention to the large number of sailing vessels lost during the war, and said that this class of vessel



"HAWK" BRAND STEEL

**HAWK
VANADIUM"
TOOL STEEL**

*Remarkable in its glass
Hardness, Toughness and
Cutting Efficiency.*

Will give twice the cut
of a regular tool steel
at one grinding.

Order "Hawk Vanadium"
for your End Mills
and cutters. Once
known—always used.

**Large Stock. Prompt
Shipment.**

Write for full particu-
lars to

**Hawkrider Brothers
Company**

Main Office and Warehouse:
303 Congress Street, Boston, Mass.
Storehouses Malden, Mass.

STEEL
OF EVERY DESCRIPTION
SEND US YOUR ENQUIRIES.

MORTON MANUFACTURING CO.
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R SHAPERS
FINISHED MACHINE KEYS
STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE...WORKS. MUSKEGON HEIGHTS U.S.A.



GREB RIM TOOL

Operates all types of cross-
cut rim. "Waller" type
can make a frame to form
it in, or cut of plate and
then bent to form grooves
or flanges, etc. Do
not remove, change. Provide
smooth ends. The last rim
on the market and have
been tested and found
to be the best. **THE GREB TOOL CO.**
We also make the

THE GREB CO., 223 State St., BOSTON



**A Drinking Water Service
that will last a LIFETIME**

What you will pay for a few ordinary drinking
cups will meet the cost of the

PURO SANITARY
DRINKING
FOUNTAIN

(MADE IN CANADA)

DRINKING CUPS ARE UNSANITARY but
the "Puro" delivers clean, fresh water at a
reduction of 15% to 36% in water bill.

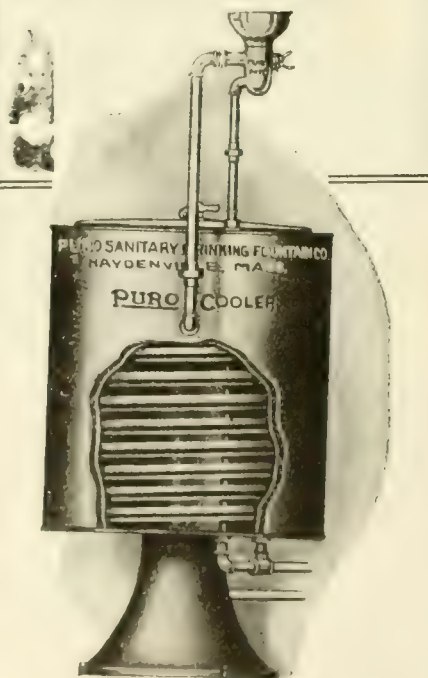
"PURO" WILL SAFEGUARD THE
HEALTH OF YOUR EMPLOYEES and pro-
tect your staff against disorganization by sick-
ness.

Easily attached. Simply unscrew the ordi-
nary faucet and put on the "Puro."

Write us to-day for full information regarding
the cost of installation of the "PURO" San-
itary Drinking Fountain Service.

Puro Sanitary Drinking Fountain Co.

Canadian Agents:
McKENZIE BROS.
18 St. Alexis St., Montreal, P.Q.



BETTS
HEAVY DUTY MACHINE TOOLS
Lathes, Planers, Mills, Drills, Shapers, Boring
Machines, etc.
BETTS MACHINE CO.
406 BLOOMING ROAD, ROCHESTER, N.Y.

was in demand and could be built in
Victoria.

Trade With South America.—A new
company has been formed by South
American, United States and Canadian
engineers and business men to promote
trade between North and South America.
The firm will be known as Trading En-
gineers Inc., and will have offices all
over South America. The Brazilian
manager is at present in Canada en-
deavoring to interest Canadian firms in
the South American market. The com-
pany has a capital of \$450,000.

C.P.O.S. and Furness Withy.—Sir
Frederick Lewis, of Furness, Withy &
Co., has announced the completion of an
arrangement with the Canadian Pacific
to supply half the tonnage required in
the services to Montreal and London,
and Montreal and Antwerp. These lines
are known as the Canadian Pacific Joint
Services. The Furness-Withy Co. have
also taken over the New York and Ber-
muda service of the Quebec Steamship
Company, and have bought the steamer
"Bermudian." In St. John, N.B., they
have acquired the business of William
Thomson & Company, who for many
years acted as the company's agents in
that port.

Albert H. Mitchel has become asso-
ciated with H. W. Cotton, Inc., of Brook-
lyn, N.Y., as vice-president and general
sales manager, with headquarters at
their New York office in the Woolworth
Building. Mr. Mitchel was formerly
for nine years with Taft-Pierce Mfg.
Company of Woonsocket, R.I., having
been in their engineering depart-
ment there, after which he
entered the sales department as Chicago
representative. For the last five years
he has been at their New York office
as district sales manager. The H. W.
Cotton, Inc., have a large plant in New
York State for designing and building
jigs, tools and special machines.

Edward R. Abbott has joined the sales
force of H. W. Cotton, Inc., of Brooklyn,
N.Y. He will have charge of the West-
ern business, making his headquarters
for the present in the Woolworth Build-
ing, New York City, and later at Cleve-
land, Ohio. Mr. Abbott was formerly
with the Taft-Pierce Mfg. Company of
Woonsocket, R.I., as a member of the
sales force of their New York office for
several years.

Fire Did Not Stop Them.—The Eureka
Pattern & Mfg. Co., Ltd., 337 King St.
West, of which D. B. Adamson is the
manager, had an unfortunate fire in
their premises on Sunday morning. It
is not going to put the firm out of com-
mission, as they are already prepared
to go ahead with their lines of making
patterns, designing jigs, tools, etc.

A New Machine.—The Williams Tool
Co., Erie, Pa., manufacturers of pipe-
cutting machinery, have developed a ma-
chine and attachment for cutting both
straight and tapered threads. This
operation has, in the majority of cases,
required a lathe, and it is claimed for
the new type of machine that it will do

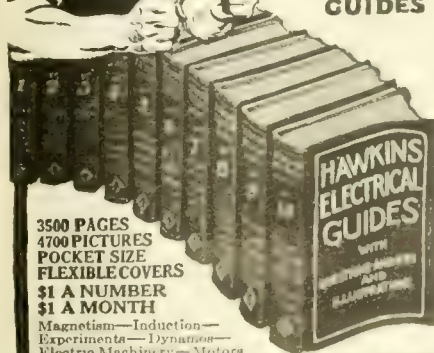
the work in one-tenth of the time. A fuller and more detailed description of the machine will appear in CANADIAN MACHINERY later.

Rousing Sales Meeting.—The Independent Pneumatic Tool Company, general offices, No. 600 West Jackson Boulevard, Chicago, has just completed a very successful sales meeting at which branch managers and representatives from the north, south, east, west, and Canada, were in attendance. The meeting was in charge of Vice-President and General Sales Manager R. S. Cooper; other officials of the company in charge being: John D. Hurley, president; F. W. Buchanan, secretary; Adolph Anderson, assistant to president; F. B. Hamerly, works manager; Axel Levedahl, consulting engineer; and R. A. Norling, C.D.

Get Bigger Pay through ELECTRICITY

You will find in HAWKINS GUIDES just what you need to know about electricity. In simple everyday language—complete, concise, to the point. In questions and answers. A complete standard course in Electrical Engineering. Send for your set today to look over.

HAWKINS ELECTRICAL GUIDES



3500 PAGES
4700 PICTURES
POCKET SIZE
FLEXIBLE COVERS
\$1 A NUMBER
\$1 A MONTH

Magnetism—Induction—
Experiments—Dynamics—
Electric Machinery—Motors—
Armatures—Armature Windings—Installing of Dynamos—
Electrical Instrument Testing—Practical Management of Dynamos and Motors—Distribution Systems—
Wiring—Wiring Diagrams—Ignition—Flashes—Storage Batteries—
Principles of Alternating Currents and Alternators—
Alternating Current Motors—Transformers—Auto-converters—Rectifiers—Alternating Current Systems—Circuit Breakers—Measuring Instruments—Testing Bench—
Power Stations—Installing—Telephone—Telegraph—
Wireless—Bells—Lighting—Railways—Also many modern Practical Applications of Electricity and Handy Reference Index of the 10 numbers.

Shipped to you FREE. Not a cent to pay until you see the books. No obligation to buy unless you are satisfied. Send coupon now—today—and get this great help, library and see if it is not worth \$100 to you—you pay \$1.00 a month for 10 months or return it.

**SEND
NO MONEY**

THE AMERICAN
ELECTRIC ASSN., N. Y.
Sole and exclusive agents for Canada
Electrical Guides
Single copies 10c. per copy
Full set \$10.00. Cash or C.O.D.
Name _____
Address _____
City _____ State _____
Month and year _____

Signature _____

Occupation _____

Employed by _____

Residence _____

Reference _____



A Handy Machinists RULE

Combining measurements 1/32nds—1/64ths together with tap drill sizes and decimal equivalents.

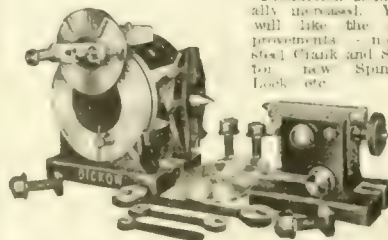
LUFKIN

TAPES AND RULES

Accurate and Durable

THE LUFKIN RULE CO. OF CANADA, LTD.
WINDSOR, ONT.

Dickow's 10-in. Universal Index Centers Have Time and Labor Saving Accuracy



Patents Pending Prompt Delivery
For Dependable Accuracy Get Dickow's
Sold by dealers.

Write us for complete description
Fred C. Dickow, 1859 W. Lake St., Chicago, Ill.

PLEWES Limited

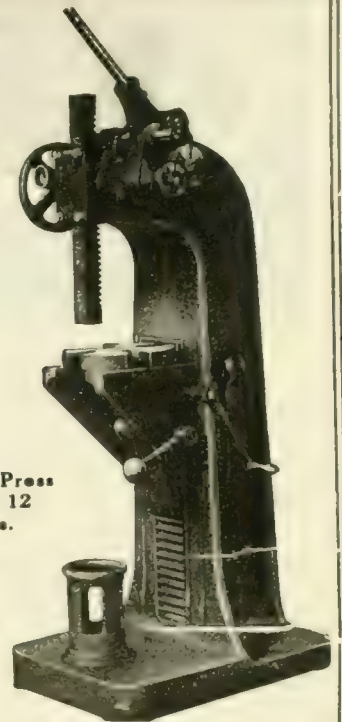
WINNIPEG
For All

Machinists' Supplies

Machine Tools
FOR SHIPBUILDERS ETC ETC

BERTRAMS LIMITED
ESTABLISHED 1884

OVENS
Japanning and Varnishing Ovens heated by Gas Electricity Steam or Coal. Removes Siphonage Ventilators, Bakers' Ovens, truck casters, etc. Write for Booklet.
Brantford Oven & Rack Co., Ltd.
Brantford, Canada.



No. 4 Press
10 to 12
tons.

Write for complete information on Atlas Arbor Presses. All sizes for all purposes.

ATLAS PRESS CO.

330 N. Park St.
Kalamazoo, Mich., U.S.A.

Clear Wired and Frosted Portlights



PROMPT DELIVERIES

Canadian Representative:

John Lindsay

34 Victoria Street, Toronto

CLASSIFIED ADVERTISING

Rates (payable in advance): Two cents per word first insertion; one cent per word subsequent insertions. Count five words when box number is required. Each figure counts as one word. Minimum order \$1.00. Display rates on application.

SECTION

HELP WANTED

DEAD-SMITH WANTS LAYTON SEVEN
R. J. W. A. C. 100
blue prints. J. Gorton, 28 Germain St., St. John,
N.S. (c19m)

WANTED FIRST CLASS DIE SINKERS ON
A. J. C. 100
blue prints. J. Gorton, 28 Germain St., St. John,
N.S. (c19m)

WANTED MACHINE SHOP FOREMAN AC-
cording to experience. Must be able
to set up, run, and maintain own men. Machine
shop, Cleveland, Ohio. Write to: Cleveland
Machinery Co., 1411 Madison Ave., Toronto, Ont.
(c19m)

GOOD OPENING FOR AMBITIOUS YOUNG
man, graduate in Mechanical Engineering,
preferably 21 to 25 years of age. Canada
Power Company, Welland. (c19m)

MACHINE TOOL SALESMAN WANTED.
Must have experience in both iron and wood-
working machinery. Applications by mail only
stating experience, etc. Canada Machinery Cor-
poration, Limited, Galt, Ont. (c20m)

MACHINERY WANTED

COLLIEAU CUPOLA, 10 TO 12-TON WITH
blast, forced draft, blower, 1800 R.
P.M. 2200 lbs. pressure. Must be in good condi-
tion. Send full particulars to Box No. 637, Cana-
dian Machinery. (c20m)

FOR SALE

ABOUT 100 LBS. RED CUT SUPERIOR AN-
nealed H.S. speed steel 4 x 1/2 at 200.
Write A. E. Curry, 22
Galt Ave., Ontario. (c20m)

MACHINE WORK WANTED

MACHINE WORK WANTED FOR LATHES.
shapers, milling machine and planer, etc.
Hourly or contract basis. Prompt delivery. W. H.
Sumbling Machinery Co., Toronto. (c19m)

PATTERNS

TORONTO PATTERN WORKS, 65 JARVIS
Street, Toronto. Patterns in wood and metal
for a variety of machinery. (c19m)

BRANTFORD PATTERN WORKS ARE PRE-
pared to make all patterns of all kinds and
all sizes. Also to make all kinds of sand
castings. Prompt, efficient service. Bell
Phone 111. Main Street, Brantford, Ont.
Norman & George St. Brantford, Ont. (c19m)

Mining Machinery for Sale

Alley & McLellan Air Compressor 600
ft. at 100 lbs. pressure, 125 H.P.
Motor, heavy duty 600 R.P.M. 3 phase
60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22.
1 Power & Mining 5 x 22.
Also large assortment of Pumps, Tanks,
Classifiers, Boilers and Mining Equip-
ment for sale.

Zenith Coal & Steel Products Limited

402 McGill Building Montreal
1410 Royal Bank Bldg., Toronto, Ont.

BRASS ROD For Sale

At a Very Attractive
Price

Free Turning Round Brass Rod

Mill lengths of the following sizes:—	Diameter
30,000 lbs... .250"	1 1/4"
24,500 lbs... .533"	Abt. 17/32"
62,500 lbs... .625"	5/8"
73,250 lbs... .750"	3/4"
27,500 lbs... .9375"	15/16"
46,750 lbs... 1.000"	1"
45,000 lbs... 1.250"	1 1/4"
26,000 lbs... 1.375"	1 3/8"
39,000 lbs... 2.000"	2"

Above is all new material stored
at the manufacturers' plant in
Connecticut, ready for prompt
shipment and has passed Gov-
ernment inspection. Address
Box 625 Canadian Machinery.

WHEN WRITING ADVERTISERS
PLEASE MENTION THIS
PAPER

NEW MITRE BOX PATENT

If you are interested in buying a patent
for the latest labor-saving device in mitre
boxes, address Box 636, Canadian Machin-
ery. (c22m)

Wanted

A firm of Canadian engineers to manufac-
ture and sell on royalty basis a hand-
operated stoker. This is an established
appliance, and is the ideal installation for
the small plant, where investment cost is
an important item. Combustion principles
are same as on highest priced automatic
stokers. The ideal stoker for the Canadian
market, where the one boiler plant is in
the majority. Write to Box 632, Canadian
Machinery, 143 University Ave., Toronto,
Canada.

Wanted by manufacturer of
mechanical hot blast heater,
good, live agent to represent
them in Canada, one calling on
foundries and machine shops
preferred. Good proposition to
right party. Splendid co-
operation will be given. Apply
Box RG, Canadian Machinery.

PATENTS FOR SALE

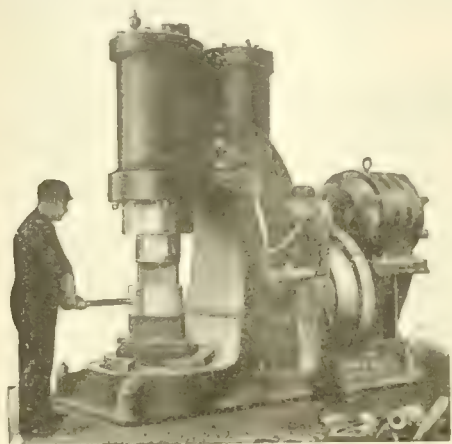
Two Canadian Patented
Steam Specialties for
sale; one Steam Trap,
Patent Number 187215,
and one Steam Separator,
Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

The Nazel Air Hammer

(A Self-Contained Unit)

Noted for Its Blow and Control



The Most Modern Reliable Power Driven Substitute for the Steam Hammer.

Built in 3 types, 6 sizes, arranged for belt or direct motor drive, with capacities up to 7" square for all manner of jobbing, manufacturing and certain classes of die forging. Write for catalogue.

Nazel Engineering & Machine Works
Dept. F., Philadelphia, Pa.

International

SPECIALISTS

in

Railway, Marine and Industrial Supplies

Duntley Dayton Pneumatic Tools.

Daniel's P.P.P. Packing.

Ebonite Packing.

Pump Valves.

International High Pressure Sheet Packing.

International Red Rubber Packing.

Plastic Metallic Packing for Piston Rods and Valve Stems.

Paxton & Mitchell Locomotive Rod Packing.

Rapid Hose Coupler, for all Hose Connections.



Write or Wire Your Requirements

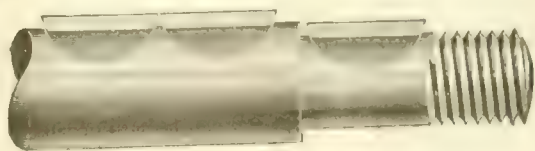
International Machinery and Supply Company, Limited

421 St. James St., Montreal

"WHITNEY" MACHINE KEYS

For the

Woodruff System of Keying



75% SAVED

THIS IS WHAT SOME OF OUR CUSTOMERS SAY

Used by the leading builders of automobiles and machine tools where strength, economy, and absolute interchangeability are a necessity.



Furnished in our Regular High Carbon Steel

Furnished in Nickel Steel Heat Treated

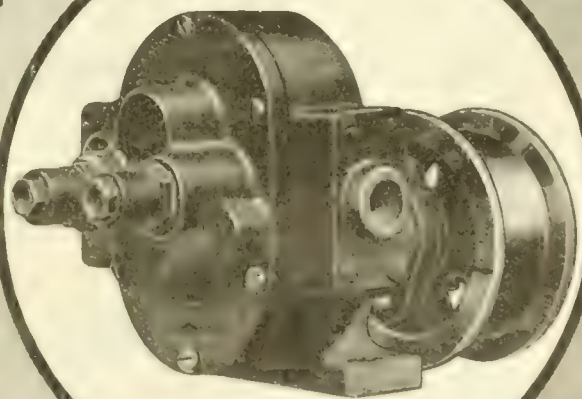
The Whitney Mfg. Co.
HARTFORD, CONN.

Chains

Keys and Cutters

Hand Milling Machines

TRAHERN PUMPS



TRAHERN PUMP DIV.
Geo. D. Roper Corp.
ROCKFORD, ILLINOIS, U.S.A.

SURPLUS EQUIPMENT FOR SALE

PRESSES

	Stroke Inches	Width Bed	Approx. Cap. Tons
2—No. 666 Toledo Embossing Presses	2	32	1,200
1—No. 26 Bliss Embossing Press	2	30	800
2—No. 27 Bliss Embossing Presses	2	32	1,000
2—No. 59 Toledo Crank Presses, double back geared	12	31	350
1—No. 57 Toledo Crank Press, double back geared	24	24	300
3—No. 77½ Bliss Crank Presses, double back geared	18	30	350
2—No. 87 Bliss Crank Presses, double back geared	16	27	250
2—No. 60½ Bliss Rack and Pinion Drawing Presses	60	21	100
12—No. 60½ Bliss Rack and Pinion Drawing Presses	42	21	100
1—No. 857 Toledo Rack and Pinion Drawing Press	48	25	100
5—No. 2W Bliss Tapering Presses	24	..	40
1—Robertson Hydraulic Press with pump and extra set of columns	24	27	800

LATHES

35—Special Cartridge Case Bullard Turret Lathes.

FURNACES

5—25' x 8' Rockwell Double Door Annealing Furnaces.

2—16' x 8' Rockwell Double Door Annealing Furnaces.

Above equipped with combination oil and gas burners, recording and indicating pyrometers, air rams and air pullers, etc.

1—Gas Furnace for annealing brass turnings.

Hardening Furnaces and Tanks.

MISCELLANEOUS

1—Metal Band Saw.

1—Gray Metal Cutter.

1—No. 1 Quick Work Rotary Shear, 60" throat.

1—Tinius Olsen Testing Machine, 10,000 lbs.

1—Brinell Testing Machine.

1—Boland Sand Blast Machine (new).

1—Sauveur Boylston Photo Micrograph Outfit.

1—No. 2 Garvin Vertical Tapping Machine (new).

Number of Speed Lathes.

Connersville Positive Blowers.

Skeleton Blowers.

Sturtevant Blowers.

Platform Scales.

Assortment of Tool Crib Tools, comprising Drills, Taper Shank Sleeves, Arbors, Lathe Dogs, Taps, Grinding Wheels, Reamers, Milling Cutters, etc.

Wood and Iron Pulleys, Shafting, Hangers, Bearings, Couplings, etc.

Motors—10 to 75 h.p., 25 and 60 cycle, 220 volt, 3-phase.

Air Hoists, 4 and 6".

Sheet Steel—about 100 tons of 14 H.R. one pass C.R. annealed.

CANADIAN CARTRIDGE COMPANY, LIMITED

HAMILTON, CANADA

United States Government Surplus Property For Sale

By Toronto District Salvage Board, Ordnance Department,
U.S. Army.

Miscellaneous Machinery—Shop Equipment—Miscellaneous Tools—Electrical Equipment—Testing Equipment—Miscellaneous Hardware, etc.

Comprising

MISCELLANEOUS MACHINERY

Lathes—Millers—Grinders—Shapers—Planers—Presses—Boring Mills—Drillers—Sand Blasts—Screw Machines—Thread Millers—Varnishing Machines—Hack Saws—Forging Equipment—Centering Machines, Etc.

SHOP EQUIPMENT

Forges—Furnaces—Blowers—Air Compressors—Accumulators—Pumps—Trucks—Shafting—Tanks, Oil—Tanks, Quenching—Tanks, Storage—Scales—Welding Equipment—Cranes—Hoists—Pulleys—Blowers—Chain Blocks—Vises—Conveyors—Runways—Belting—Miscellaneous Hardware—Etc.

MISCELLANEOUS TOOLS

Boring Bars—Chucks—Reamers—Tool Holders—Twist Drills—Taps and Dies—Micrometers—Etc.

ELECTRICAL EQUIPMENT

Generators—Motors—Transformers—Switch Boxes—Miscellaneous Supplies—Etc.

TESTING EQUIPMENT

Pyrometers—Testing Machines—Brinell Machines—Etc.

Information regarding above may be obtained by applying to

**Chairman, Sub-Committee on Buildings and Equipment
District Salvage Board, Ordnance Department**

39 ADELAIDE STREET EAST

TORONTO, ONTARIO

TOOLS & STAMPINGS



We have the equipment to make the tools and produce the stamping. Let us quote on your requirements.




HOMER & WILSON
Stamping and Tool Works
1-5 Lancaster St., Hamilton

SPECIAL MACHINERY

Built to Order

Also gauges, punches, jigs, dies, small tools, etc.
Prompt Service.
Moderate cost.
Send Blueprints for estimate.

Brown Engineering Corporation LIMITED, TORONTO
415-419 King St., W. Tel. Adel. 425



STEEL TANKS

THE TORONTO IRON WORKS

HEAD OFFICE: ROYAL BANK BLDG. LIMITED TORONTO WORKS: CHERRY STREET

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

VICTORIA Special Machinery
DESIGNS PATTERNS
CASTINGS FORGINGS

Send for Catalogue

Victoria Foundry Co., Limited, Ottawa, Canada

WELDING APPARATUS AND SUPPLIES

The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

Write to us for anything and everything you need.

WELDING & SUPPLIES COMPANY

C. ROYER, Manager

1142 Ontario Street East, Montreal

**BUY
VICTORY BONDS
NOW**

Canada Needs Your Support

THE SMART-TURNER MACHINE CO., LTD.
HAMILTON, ONT.

SPECIAL TOOLS

Automatic Machinery
for all purposes

Punch Press Work

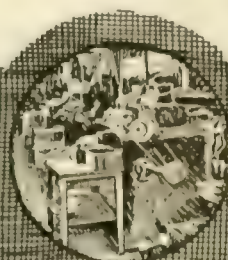
Screw Machine Products

Consult us on your machine problems

Toronto Tool Company

516 Richmond St. West

Phone Adel. 1181





HACK SAWS AND TOOTH SHAPES

Right down at the bottom of cheaper cutting costs is the shape of the tooth. Years of experiment and actual working tests have given us the "Standard" shape tooth. It 'cuts quicker and lasts longer.'

And here's the reason. As a saw is used the points are worn off and the "contact area" of the teeth on the work becomes so great that enough weight to make the teeth "bite" crushes or breaks the blade. In other words, "the saw is dull."

Another thing: In the acute or "positive" angle tooth the leading edge points in the direction of the cut, it's always "digging in" under the surface and most likely to strip. The negative angle tooth simply scrapes off the metal and does not actually cut at all. The hook tooth is under the same handicap as the acute angled tooth. In all unusual teeth the "contact area," the friction producing surface, is greater than with the "Standard" tooth.

The easiest, surest way to get economy in Hack Saws is to use Starrett Blades with the Starrett Chart. Send for Catalog No. 21 "3"

THE L. S. STARRETT CO.

*The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled*

ATHOL, MASSACHUSETTS
NEW YORK LONDON CHICAGO



Starrett Hack Saws

If interested tear out this page and place with letters to be answered

ANNOUNCING THE NEW

ONE OF THE MOST IMPORTANT ANNOUNCEMENTS MADE IN YEARS TO THE USERS OF GRINDING WHEELS IS ON THE NEXT PAGE

IT TELLS ABOUT THE REMARKABLE NEW ABRASIVE
ALOXITE AA

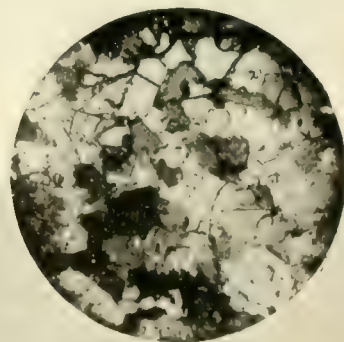


Photo No. 1—Microphotograph showing size of alumina crystals of the ordinary aluminous abrasive. The average diameter is .0027 inch.

THE CARBORUNDUM COMPANY

NEW YORK CHICAGO BOSTON DETROIT CLEVELAND PHILADELPHIA

If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

ABRASIVE ALOXITE AA

FOR some long time the Carborundum Company has felt that industry needed a new abrasive for grinding high-speed steel, case-hardened steel—for the grinding of reamers, cutters, hob mills—for the grinding of certain cylindrical work and for grinding broad steel surfaces where a large amount of stock is to be removed. Such work called for an abrasive that could be bonded into a wheel that would not only cut cool, but would show marked uniformity in its structure, and would, at the same time, cut grinding costs by producing more work and lasting longer.

The Need Has Been Met and Filled with the NEW ALOXITE AA WHEEL

Aloxite AA is a new aluminous abrasive. It is from 98½ to 99 per cent pure alumina. There are just enough other ingredients, in just the right proportions, to produce a desirable toughness. One of the most distinctive features of Aloxite AA is the remarkably large size of its crystals. They are much larger than those of the ordinary aluminous abrasive. Because of these big crystals every grit or grain in an Aloxite AA wheel is a definite fragment broken from a larger crystal—and every fragment is keen edged, cutting like a tiny lathe tool, giving the wheel unprecedented sharpness and freedom of cut. Then, too, Aloxite AA Wheels can be made of an open brittle structure yet of a soft grade. This again insures free, clean cutting. Within the limits of the work mentioned, Aloxite AA Wheels have already, after repeated tests, created a furore among many users of grinding wheels.

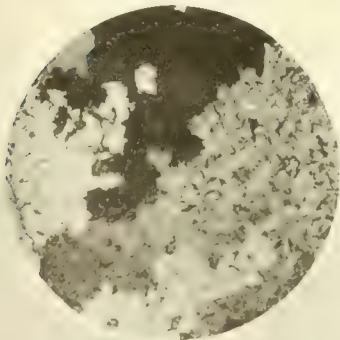
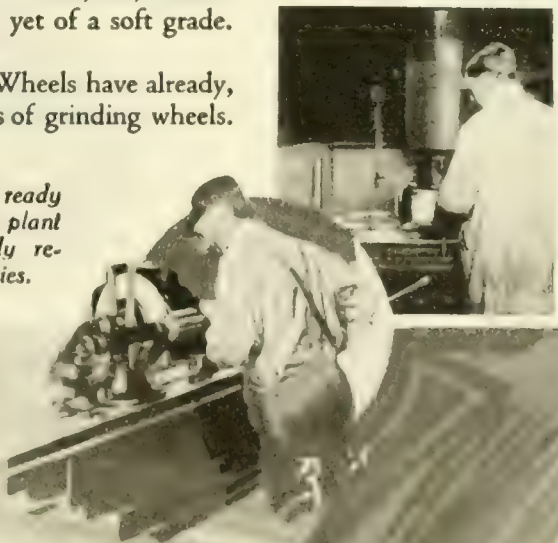


Photo No. 2—Microphotograph showing the large crystals of Aloxite AA. Each area of the same color is one crystal growth. The average diameter is .250 inch, approximately one hundred times larger.

Aloxite AA Wheels are ready right now to come into your plant and demonstrate their truly remarkable grinding qualities.



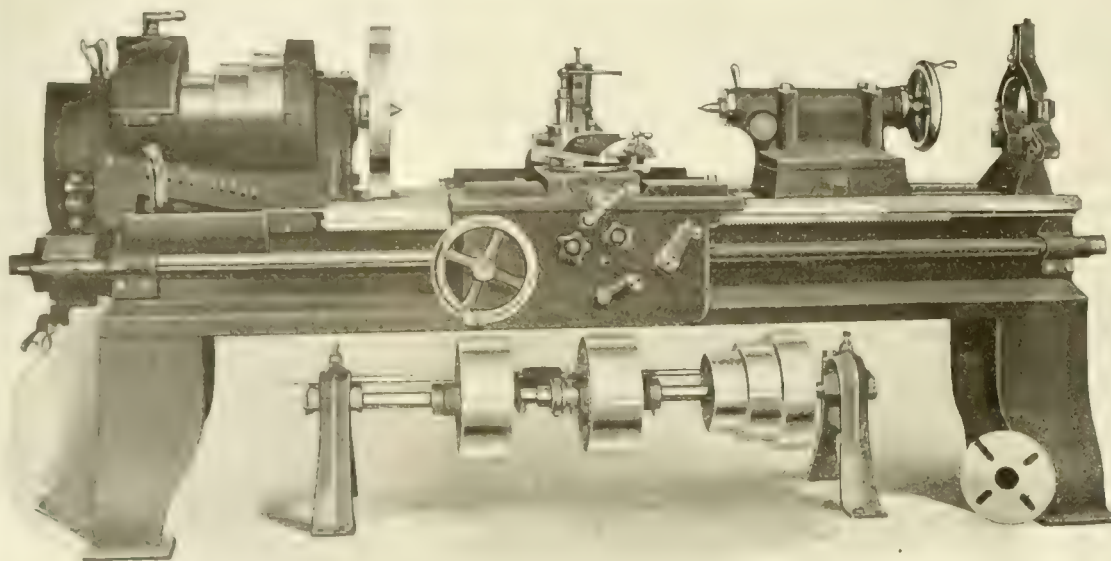
NIAGARA FALLS, N. Y.

CINCINNATI PITTSBURGH GRAND RAPIDS MILWAUKEE

If interested tear out this page and place with letters to be answered.

The "RAE" 18-Inch Quick Change Lathe

Double Back Geared



New Type of Webbed Headstock Insures Great Strength and Rigidity Under All Conditions.

Rae Machine Tool Works, Limited, HAMILTON ONTARIO

**When You Buy
a Lathe
what do you
expect?**

Some buy simply because of the name, but the real intelligent buyer goes deeper into the problem.

He wants to feel sure that the material and workmanship is there, together with economy of up-keep. Accuracy must be a strong point in its favor. All these features are combined in every Rae Lathe shipped from our plant.



Did You Ever See Two Postage Stamps Stuck Back to Back?

Well, that's the way two bricks stick together when our cement is used.

The greatest loss in your furnace efficiency occurs as the result of leakage, cold air pouring in and interfering with proper combustion.

We Have Got This Licked!

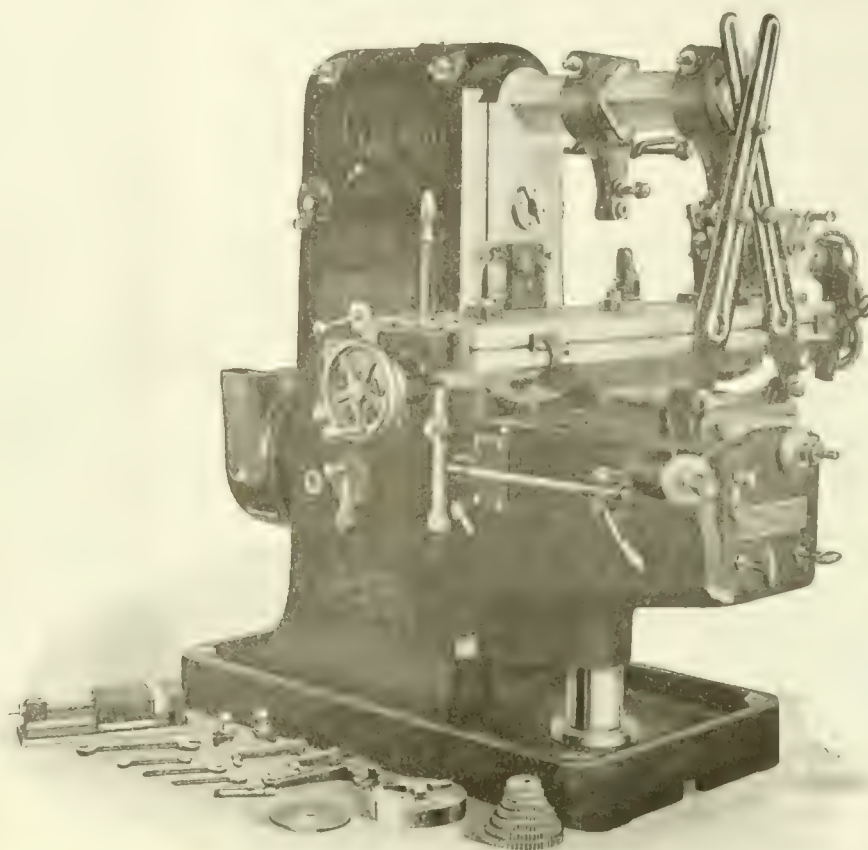
Leakage flows up and sifts out from between the bricks like powder.

But our cement sets and makes a surface like glass yet allowing for expansion and contraction. It sells hot or cold and stands a heat up to 3,000 degrees Fahrenheit.

This cement makes a joint that is stronger than the bricks themselves, and that is itself the strongest part of the entire furnace.

A five pound tin of Clinton Super-Heated Cement will be sent to you free and all charges prepaid, if you write the

Standard Machinery & Supplies Limited
261 Notre Dame St. West Montreal



CLEVELAND UNIVERSAL MILLING MACHINE

Square over-arm.

Constant speed single pulley drive.

Sixteen changes of speed.

Sixteen changes of feed.

All sliding gears, no tumbler gears.

All gears and shafts hardened and ground.

Feed box in knee.

All operating levers within easy reach of operator.

Bronze bearings throughout.

One piece elevating screw for knee.

No universal joint for feed drive.

Column and knee automatically lubricated.



Monthly Stock List of Cutters sent on request.



THE CLEVELAND MILLING MACHINE COMPANY

CLEVELAND, OHIO, U.S.A.

NEW YORK OFFICE:
1762 Woolworth Bldg

CHICAGO OFFICE:
135 Stock Exchange Bldg.

DETROIT OFFICE:
271 E. Jefferson Ave.

PITTSBURGH OFFICE:
203 Oliver Building

Milling Cutters

Milling Machines

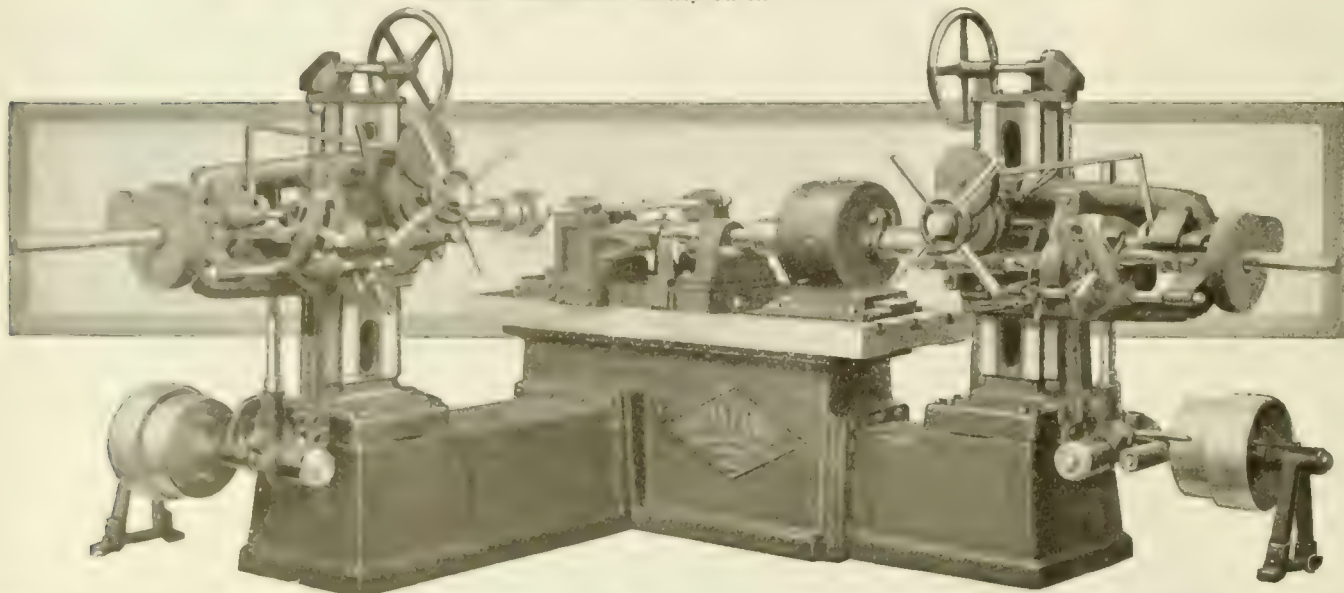
Relieving Machines

Rockford Horizontal Boring Machine

**For
Automobile
Manufacture**

This tool is unusually rapid and accurate in the boring of crank cases, transmission cases and rear axles. Has two heads at right angles to each other. Spindles bore longitudinal and cross holes in work simultaneously.

Send us blue prints of your boring work and we will give you figures on the "Rockford's" ability on it.



The Rockford Drilling Machine Co., Rockford, Ill.

WINNER

of the
**LONG SERVICE
MEDAL**

For Bearings in
High-Speed,
Heavy-Duty
Machinery



Manufactured by

**Hoyt Metal
Company**

FACTORIES:
TORONTO
LONDON
NEW YORK
ST. LOUIS

THE



FOUNDRY
GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

Send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns. We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US



**“Hey Bill !
That Won't Do.
Hitch it on to
this
WRIGHT HOIST”**

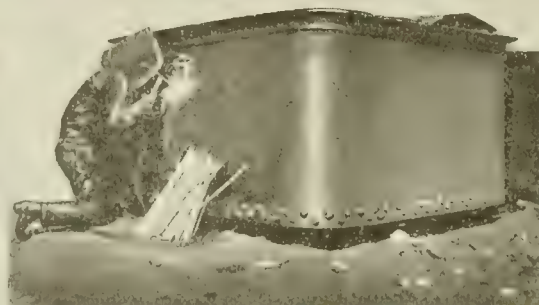
WRIGHT
MANUFACTURING
COMPANY
Lisbon, Ohio, U.S.A.
Cable Address: **WRIGHT**
The A. R. Williams
Machinery Co.
Sole Canadian Agents
Windsor, Ontario, Canada

WRIGHT
HOIST

ARMCO IRON WELDING RODS



ARMCO IRON Welding Rods



Repairing a tank with the Electric Arc and ARMCO IRON Welding Rods.

ARMCO IRON is the STANDARD guaranteed welding material

Why experiment with inferior products which endanger the weld and cause loss of time and money?

The cost of welding material is insignificant when successful welding, labor, and other items are considered.

ARMCO IRON Welding Rods may cost a trifle more per pound than some other welding rods, *but they cost less per average weld.* There is no waste due to lack of uniformity and no loss of time by the welder. They flow freely and make an even weld which lends itself well to finishing operations.

99.84 per cent Pure Iron Content (minimum) Guaranteed. In uniformity of composition and practical freedom from such foreign matter as sulphur, phosphorus, man-

ganese, silicon, slag, and oxides, ARMCO (American Ingot) IRON actually surpasses the imported welding materials which conscientious welders once considered essential for the best results.

Two kinds of rods of guaranteed ARMCO IRON analysis, one for electric welding and one for oxy-acetylene welding, do all the work (and *better* work) that formerly was thought to require a wide range of welding rods of various analyses.

There are ARMCO Distributors in all principal industrial centers. Our nearest sales office will furnish you the addresses of distributors in your locality.



PAGE STEEL & WIRE CO.

Established 1882 as Page Woven Wire Fence Co.

The trade mark ARMCO carries the assurance that iron bearing that mark is manufactured by the American Rolling Mill Company with the skill, intelligence and fidelity associated with its products, and hence can be depended upon to possess in the highest degree the merit claimed for it.

Makers of ARMCO Iron Welding Rods and Electrical Wire; "Copperweld" Copper Clad Steel Wire; Wire Mill Products, Plain and Galvanized; Wire of Special Analysis; Wire fencing for all purposes; Factory Gates; Ornamental Iron Fence; Machine Guards; Tool and Stock Room Partitions; Architectural Iron.

Plants: Monessen, Pa., and Adrian, Mich.

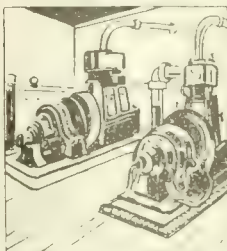
SALES OFFICES: 30 CHURCH STREET, NEW YORK

CHICAGO: 29 South LaSalle Street

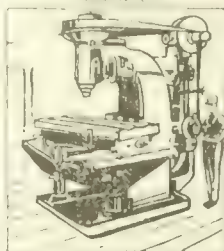
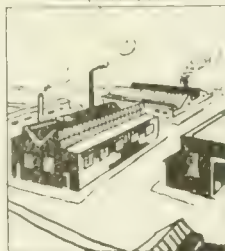
DETROIT: Book Building

SAN FRANCISCO: American Rolling Mill Company of California

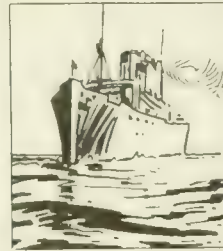
CANADIAN DISTRIBUTORS: Taylor & Arnold, Ltd., Montreal, Toronto, Winnipeg

POWER HOUSE**CANADIAN MACHINERY**

MANUFACTURING NEWS

**CANADIAN FOUNDRYMAN****MARINE ENGINEERING**

Canadian Merchant Service Guild Review



For Self-Promotion And Sales Promotion

Are you interested in any of these fields—power metal working marine?
As a manufacturer, or purchasing agent, as a superintendent or fore-
man, as an ambitious mechanic or engineer?

Use These Publications

They will keep you strictly up-to-date in all branches of mechanical engineering.
Edited by practical men. Cheerful, inviting, instructive, authoritative.

POWER HOUSE

Twice a month—\$1.00 per year now—\$2.00
January 1.

Serves the power plant engineer. Steam, Elec-
tric, Refrigeration, Hydraulic.

CANADIAN MACHINERY

Weekly—\$3.00 per year.

Covers the metal working field serving shop
executives, purchasing agents and owners. First-
class mechanical paper and market paper com-
bined.

CANADIAN FOUNDRYMAN

Monthly—\$1.00 per year.

A paper for the foundry owner, superintend-
ent and foreman. Claimed by its readers to be
unexcelled.

MARINE ENGINEERING

Monthly—\$2.00 per year.

Interprets marine engineering in its broad sense,
serving the shipbuilders, navigation companies
and their officers. (The editor holds an extra
first-class B.O.T. certificate.)

Published by

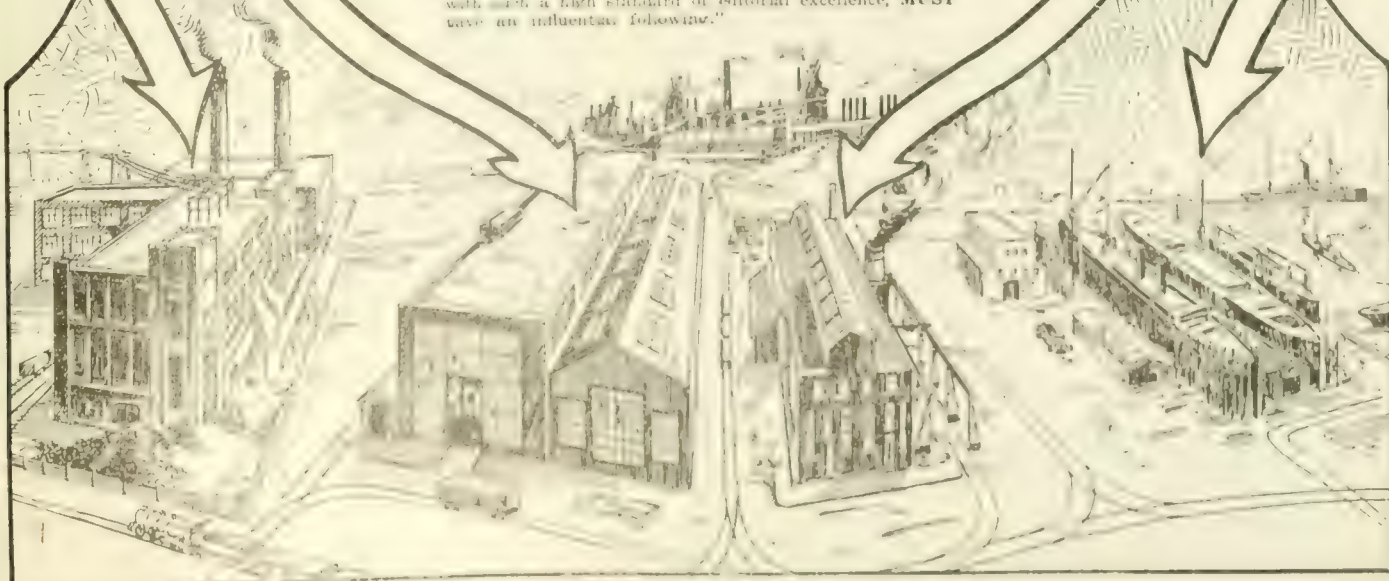
THE MACLEAN PUBLISHING CO., LIMITED

143-153 UNIVERSITY AVE., TORONTO

A company whose idea of service has made it the largest concern of its
kind in the British Empire.

Thirty years' experience and dozens of practical men, in your own line,
stand ready to serve you. Let them! Subscribe for **your** paper to-day.

Men with solving problems will find a profitable tip in the statement
made by a prominent manufacturer recently. "I use
Maclean Publications because I am satisfied that papers
with such a high standard of editorial excellence, **MUST**
have an influential following."



It is not enough to have a good idea, it must be put into letters to be answered.



MESTA MACHINE COMPANY
General Office and Works: Pittsburgh, Pa., U.S.A.

GAS AND STEAM ENGINES

for

Blast Furnaces, Rolling Mills
Power Plants
Gear Drives, Rope Drives, Condensers
Air Compressors Vacuum Pumps

ROLLING MILL MACHINERY

Blooming Mills	Tin Plate Mills
Slabbing Mills	Doubling Shears
Structural Mills	Squaring Shears
Bar Mills	Plate Shears
Continuous Mills	Bloom Shears
Tube Mills	Bar Shears
Plate Mills	Mill Tables
Universal Mills	Manipulators
Sheet Mills	Hot Saws
Rail Mills	Accumulators

Roll Lathes

Chilled, Sand, Steel and Special Rolls
Rolling Mill Pinions and Gear Drives

SPECIAL MACHINERY

Steam Hydraulic Forging Presses
Steam Hydraulic Shears
Pickling Machines Metal Mixers
Iron and Steel Cut Gears
Iron and Steel Machine Molded Gears

FORGINGS

Large Engine Shafts—Piston Rods
Ship Shafts General Forgings

CASTINGS

Carbon Steel—Alloy Steel—Bronze
Air Furnace Iron Castings
Carbon and Alloy Steel Forging Ingots

Write for Bulletins

MESTA MACHINE CO.
Pittsburgh, Pa. U. S. A.

GENUINE EMERY

Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46
40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY
GLASS
FLINT
GARNET
CORUNDUM
CARBORUNDUM

PAPER
AND
CLOTH

1.
SHEETS, ROLLS,
DISCS, BANDS,
STRIPS and
TAPES, &c.

John Oakey & Sons

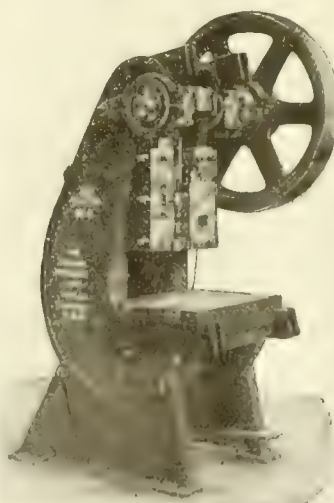
LIMITED

WELLINGTON MILLS

LONDON, S. E. 1., ENGLAND

The "TOLEDO"

Inclinable Power Presses --



Indispensable
for volume and
economical pro-
duction.

The standard for
nearly half a
century, they
embody every
modern feature
for convenience,
ease and safety
of operation and
for reducing pro-
duction costs.

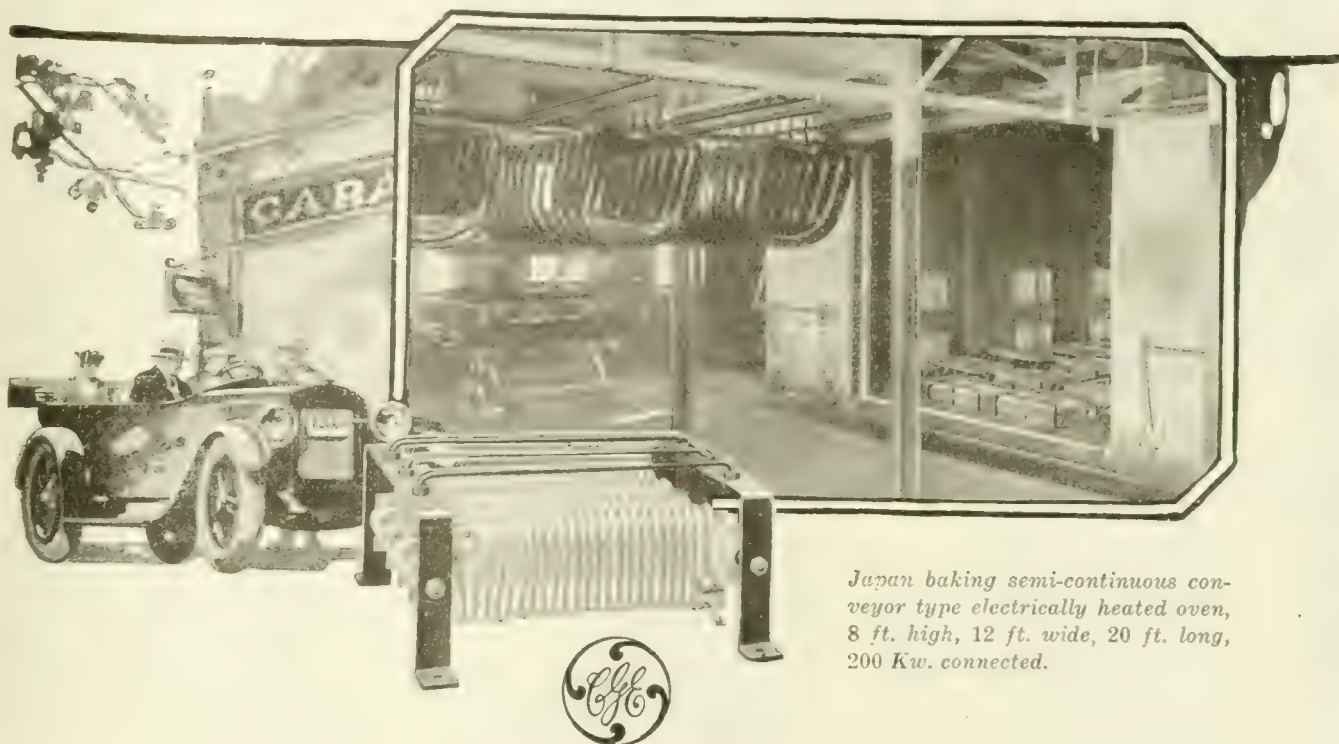
Flexible to an
almost unlimited
range of blank
cutting, forming,
perforating, drawing, shaping and combi-
nation die work.

The Toledo Machine & Tool Co.

Toledo, Ohio

Representatives: Wheel Machinery Co. of America, 19 Rue de
Rocroy, Paris, France; Via XX Settembre 12, Turin, Italy.
16 Sendengasse, Zurich, Switzerland.

The cheapest method of heating is that which reduces to a minimum the total cost of a satisfactory product.



Japan baking semi-continuous conveyor type electrically heated oven, 8 ft. high, 12 ft. wide, 20 ft. long, 200 Kw. connected.

Japan Baking the Modern Way

MANY of the principal manufacturers of automobiles have installed electrically heated ovens and in all cases great improvement in results has been realized.

Electricity can be used to supplant fuel in practically all heating operations and not only accomplishes better work, but more of it in a given time.

It has been repeatedly demonstrated that the installation of C.G.E. industrial heating equipment will effect many advantages, such as improved quality, increased production, saving in time, elimination of seconds, improved working conditions and reduced fire hazard.

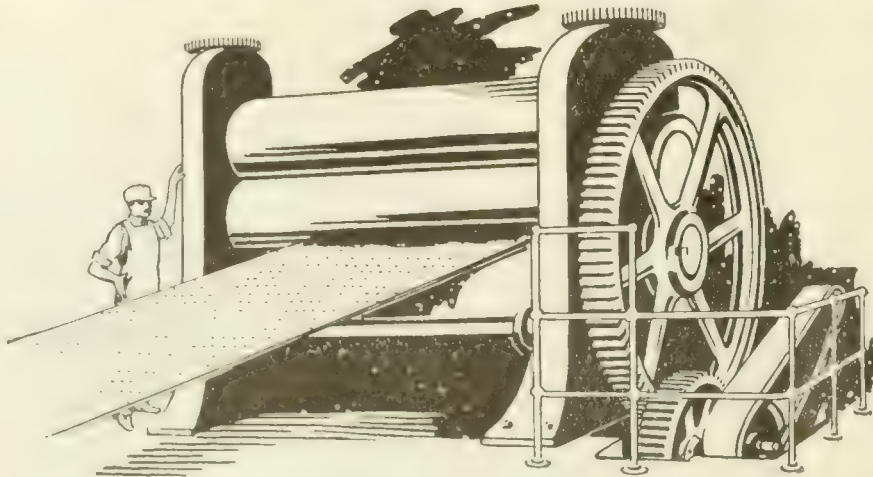
The electric way is the modern way—the proven economical way.

Write our nearest sales branch for more information

Canadian General Electric Co., Limited

Head Office - TORONTO

Branch Offices : Montreal, Quebec, Halifax, Sydney, St. John, Ottawa, Hamilton, London, Windsor, Cobalt, South Porcupine, Winnipeg, Calgary, Edmonton, Nelson, Vancouver, and Victoria



Friction Surfacing Cuts Power Bills

Here is a statement that you can prove to your satisfaction and profit.

Take the meanest drives in your plant—the ones you know are wasting power in slippage on pulleys—ask our belting engineers to specify the correct size of

Dominion Friction Surface Belting

Keep a careful record of those belts for one or two months, or even a year, and compare it with the previous performance of those same drives—then compare *your* power bills for the two periods.

Dominion Friction Surface Belting will prove, in service, every claim we make for it, because the rubber with which it is saturated is a special friction compound that prevents practically all slippage and pays for itself in the power saved.

Our engineers are ready to help you, without charge, increase *your* production and lower *your* cost by making *your* transmission more efficient.

Phone or wire our nearest Service Branch.



Makers of Dominion Hose, Packing
and Industrial Rubber Goods and
Dominion Tires, the GOOD Tires
for every purpose.

Service Branches:

Halifax
St. John,
Quebec,
Montreal,
Ottawa,
Toronto,
Hamilton,
London,
Kitchener,
North Bay,

Fort William,
Winnipeg,
Brandon,
Regina,
Saskatoon,
Edmonton,
Calgary,
Lethbridge,
Vancouver,
Victoria

56



An "Oliver" on
"Oliver"
Production

Install an **"OLIVER"**

The accuracy, convenience, and rigidity of "Oliver" Lathes, the cost and quantity of their output make them a logical choice for modern tool room or production work.

May we send our Bulletins giving full particulars on the "Oliver" Engine Lathe, "Oliver" Turret Lathes, Speed Lathes, Die Filing Machine.

OLIVER MACHINERY COMPANY

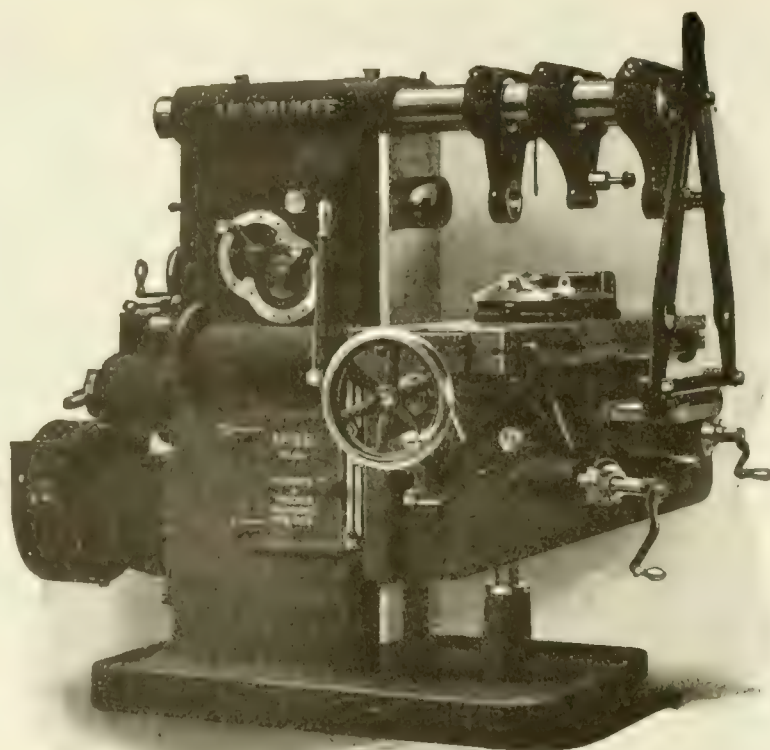
GRAND RAPIDS, MICH.

EUROPEAN OFFICE: Manchester, England

Paris, France



If you cannot find the name and place with letters to be answered.



MILWAUKEE MILLING MACHINES

Double Overarm maintains alignment.

It is impossible for the operator to place the arbor supports on the arbor and double overarm in any other way than in line. Arbor cannot be pounded out of line when using large, coarse pitch cutters on rough, heavy work.

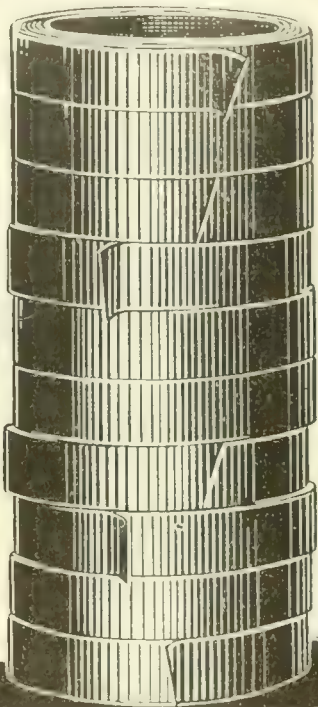
Other Distinctive Milwaukee Features:

Solid top knee—hardened steel gearing and shafts in the column and feed box—automatic flooded lubrication—one and one-half gallons of oil per minute pouring over all gears and bearings in the column and feed box, insuring lubrication at all times—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

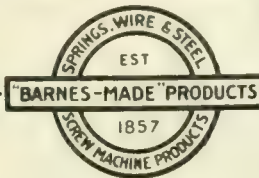
Send for our No. 21 Catalogue. Illustrating and describing Milwaukee Milling Machines and accessories in detail

KEARNEY & TRECKER CO.
MILWAUKEE, WIS. U.S.A.

The Wallace Barnes Company



"Barnes - made
for every trade"



Using Science as an Ally

Before our manufacturing processes begin, materials are submitted to our Laboratory for Chemical and Physical analyses.

By scientific infallible tests these raw products are charted, so that their absolute wearing qualities are ascertained.

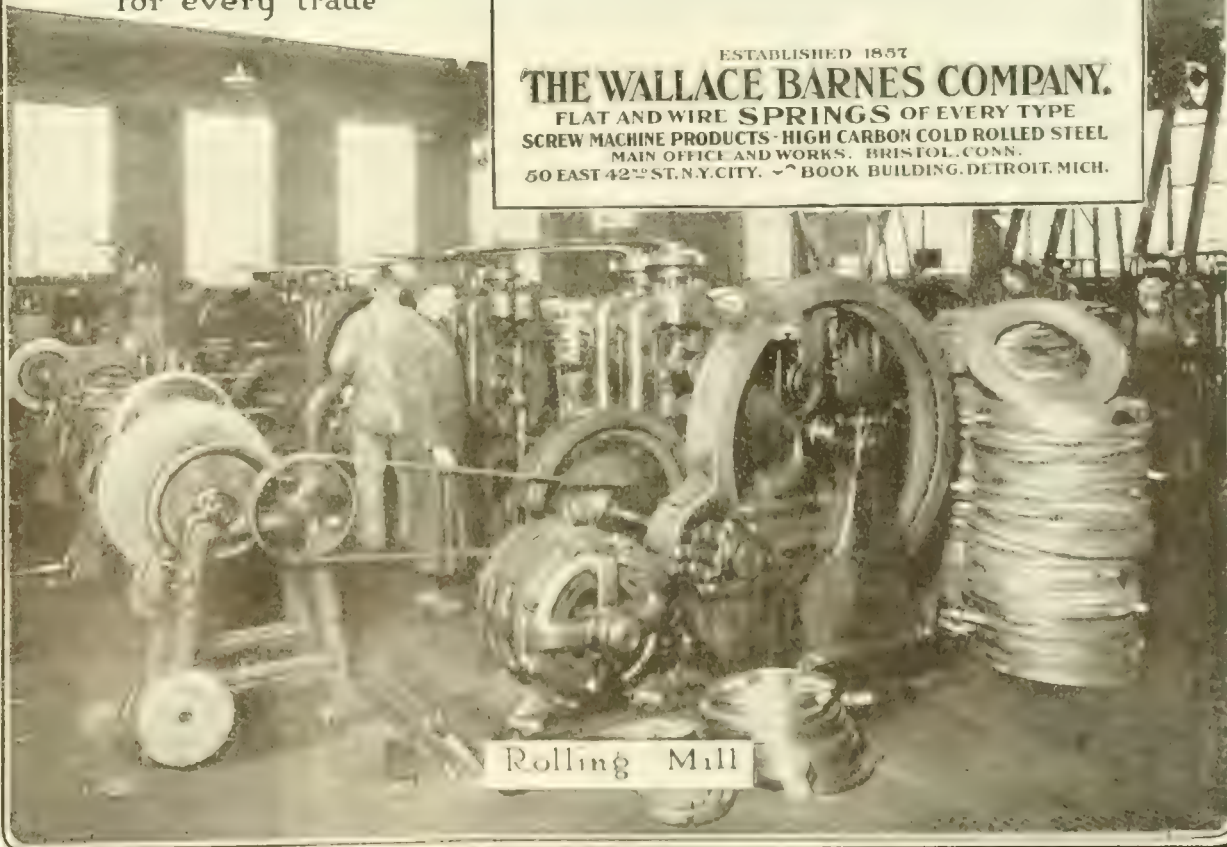
The application of science to spring making reduces the number of defective springs in the final inspection by eliminating the unfit material before manufacture.

Our springs are scientifically produced on a basis of the actual needs of the purchaser plus "Barnes-Made" quality.

ESTABLISHED 1857

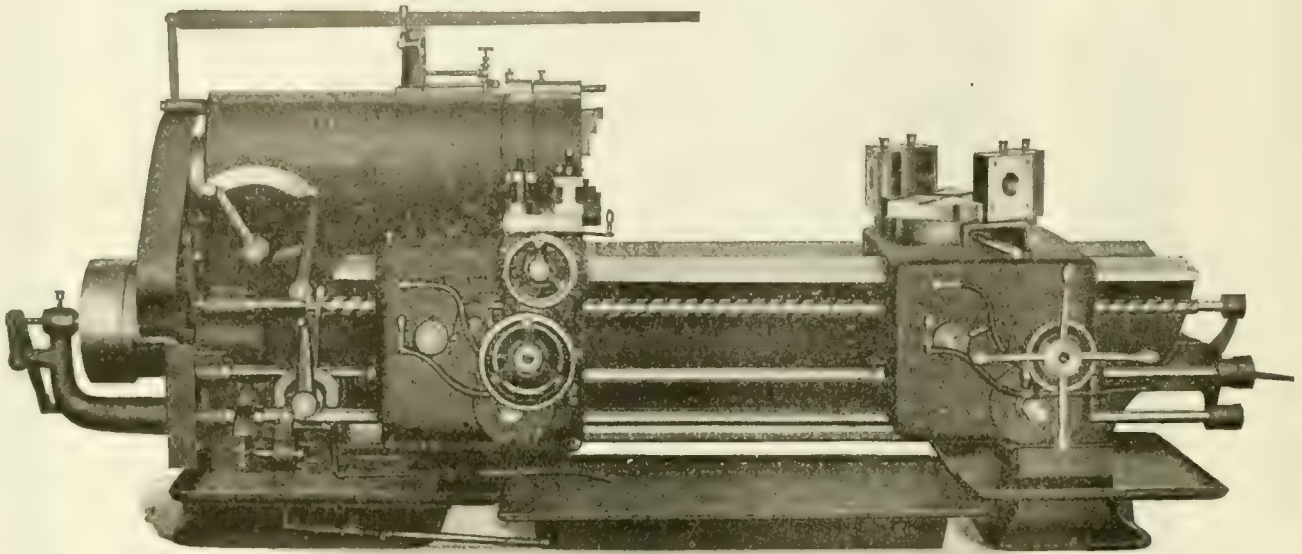
THE WALLACE BARNES COMPANY.

FLAT AND WIRE SPRINGS OF EVERY TYPE
SCREW MACHINE PRODUCTS - HIGH CARBON COLD ROLLED STEEL
MAIN OFFICE AND WORKS. BRISTOL, CONN.
50 EAST 42ND ST. N.Y. CITY. ~ BOOK BUILDING. DETROIT, MICH.



Rolling Mill

STEINLE



Still another reason why the Steinle 24" Full Swing Side Carriage Turret Lathe is ahead of all others in the economical and accurate production of many classes of work.

THE COMBINATION TURRET

In designing this turret the following points were taken into careful consideration:

The proper manner of supporting different kinds of tool equipment required on a machine of this character.

Avoidance of excessive tool overhang.

Ability to secure the full benefit of the side carriage in relation to the absence of turret tool overhang.

As regularly furnished, the combination turret is hexagon in form, 21" in diameter, and has two open sides and four bored faces. The open sides permit of universal facing heads or similar tool equipment being firmly secured to the bed of the turret and provide for suitable adjustment of tools to the work with a minimum overhang. The bored faces carry drills, boring bars, reamers, die heads, taps, etc.

The combination turret has power traverse and quick change reversible longitudinal feed controlled from the apron.

The bearing on the saddle is the full diameter of the turret. The locking pin is located in front, the greatest possible distance from king pin. One motion of the binding lever releases the pin and turret, or binds same.

The design of the combination turret secures the full advantage of the side carriage feature.

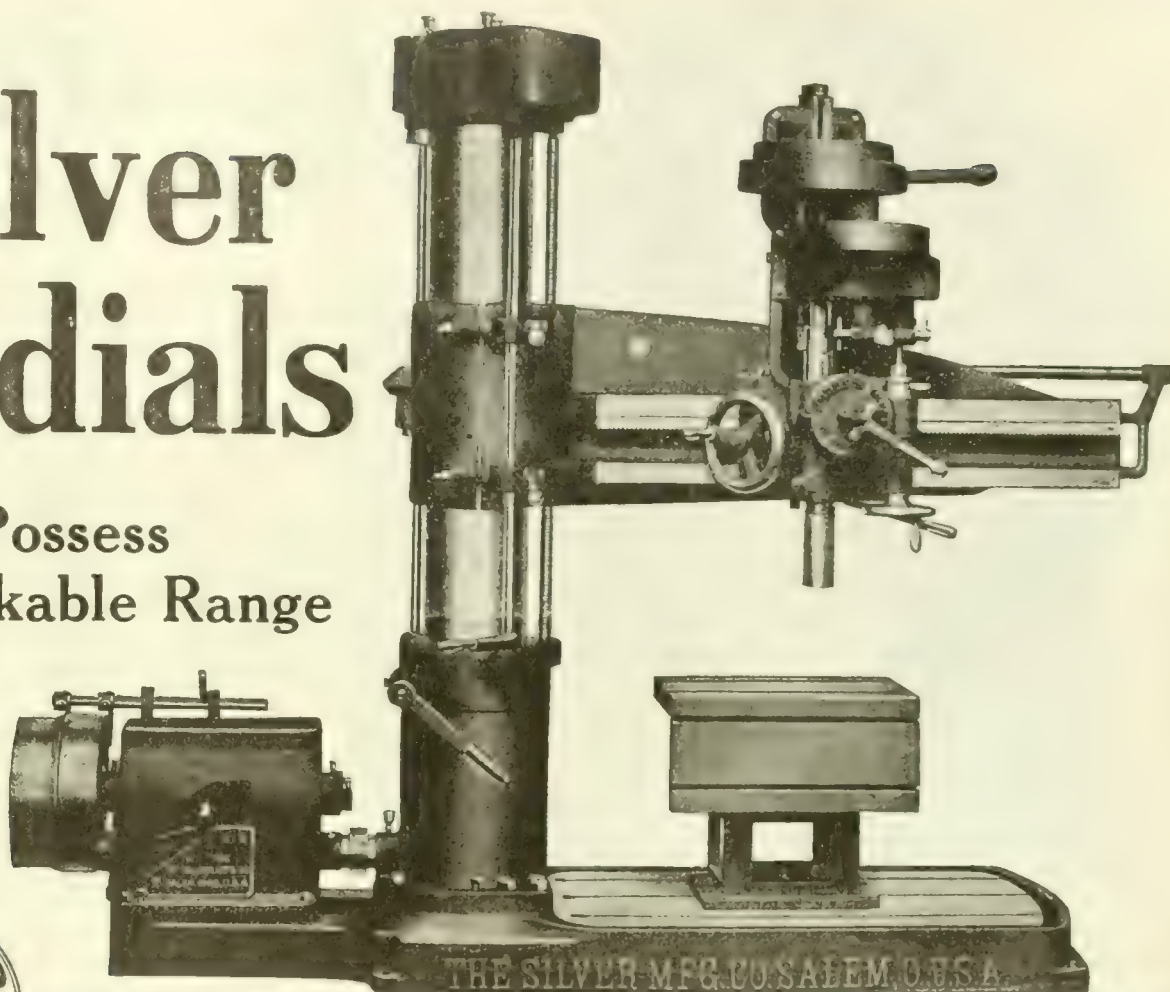
STEINLE TURRET MACHINE CO.

MADISON

WISCONSIN, U.S.A.

Silver Radials

Possess
Remarkable Range



THE possibilities of Silver Drills could not be revealed better than by a tour of the many shops where they are part of the equipment.

It is found in the many lines represented that each superintendent is convinced that the Silver meets his particular requirements. Simplicity and convenience mark every feature incorporated in these drills. Easy running, ball bearing construction, careful design and excellent balance insure increased production with these modern machines. Send for attractive folder on the new Silver Radials.

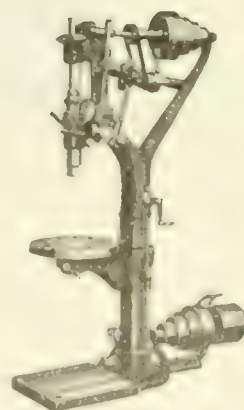
SILVER 20-inch Drills

are strong, rigid, speedy and dependable.

They are made in four distinct styles with round or square base, and in gangs of 2, 3 or 4 spindles.

These drills are adapted for all modern machine shop practice demanding speed and accuracy.

Send for our new Machinery Catalog showing our full line of drills, saws, jointers, etc.

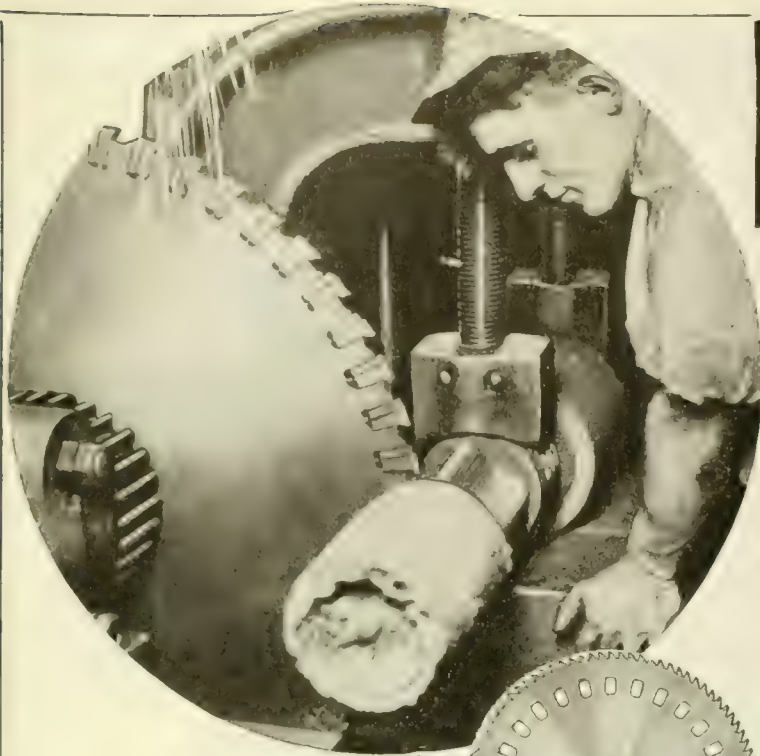


Silver 20"
Upright Drill

THE SILVER MANUFACTURING COMPANY

BOX 290

SALEM, OHIO, U. S. A.



HUNTER

Duplex Saws

The selection of many of the best and largest companies in the country for cutting ingots, bars, forgings, castings, rails and structural shapes.

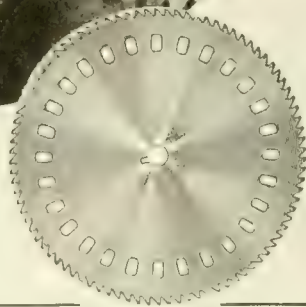
Their fast cutting qualities mean a saving of time and power, plus increased production.

Teeth are accurately formed, ground and set for highest speed and greatest endurance. Made in sizes up to 90 in. in diameter.

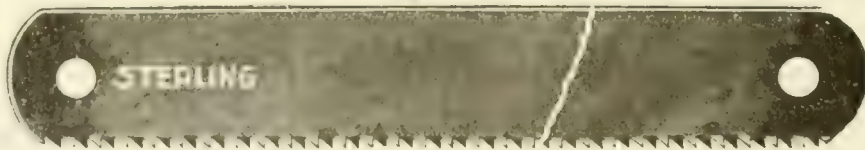
Write for price list and full particulars

HUNTER SAW & MACHINE CO.
Pittsburgh, Pa.

Hot Saws, Friction Discs, Solid Blades made of Vanadium, Tungsten and Chrome Alloy Steels, Saw Sharpening Machines, Inserted Tooth Grinders, Hardened Steel Specialties.

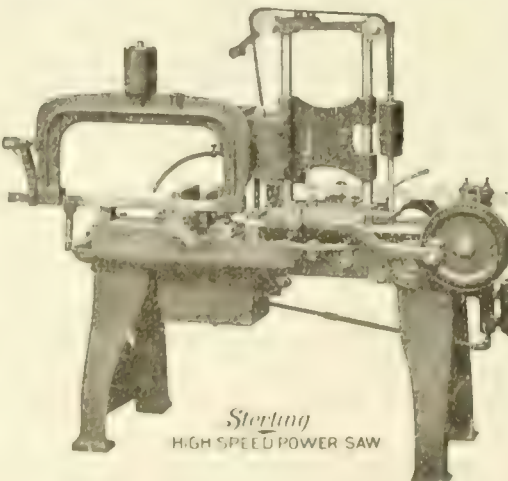


HACK "STERLING" SAWS



"STERLING" Blades are worth a trial. Tell us or your dealers of your needs.

We can save you money.



Sterling
HIGH SPEED POWER SAW

To get the best results from power blades, a good machine is necessary. Try the "STERLING." The combination is excellent.

Manufactured by

DIAMOND SAW & STAMPING WORKS, 357 Seventh St., Buffalo, N.Y.

Photographic Copying The PHOTOSTAT

(Trade Mark Registered)

"Orders are now delivered three or four days earlier to our customers by making photographic copies of sketches and drawings which are the same in every detail instead of having our draftsmen reproduce the original.

"Practically all orders were previously held up three or four days by our drafting department while copies of the intricate drawings of ordered tools were being made. Now with the Photostat, only 15 or 20 minutes are required to make the three copies, exact duplicates of the original, which the factory needs to turn out the order. By eliminating this needless delay we are able to provide better service for our customers, and attract new prospects because of prompt deliveries."



This cut shows a PHOTOSTAT on which a large drawing has just been copied in less than a minute.

Never Makes a Mistake

It is simple, practical, easy to handle. Requires no expert knowledge. The machine is loaded with a roll of sensitized paper especially manufactured for the purpose.

The original subject is photographed directly upon this paper producing a facsimile copy which is immediately cut off, developed and fixed right in the PHOTOSTAT itself.

The focusing, exposing and developing are all controlled by simple mechanical devices and no glass plate, film or other intermediate negative has to be made.

After fixing, the copy is removed to a tank of running water and rapidly washed free from chemicals. It is then dried and is ready for use. As many copies as desired may be run off in this manner.

By a simple adjustment of the mechanical focusing device the copy may be made at actual size, reduced, or enlarged, within the size limitations of the machine.

Error in copy is impossible because every copy is an absolute facsimile. The operations are all simple, such as a boy or girl can do.

The PHOTOSTAT Copies

Pencil Drawings,	Ink Drawings,
Tracings,	Reports
Shipping Lists,	Data Sheets,
Contracts,	Ledger Pages,
Illustrations for Salesmen,	Insurance Records,
Sketches,	Blue Prints,
Specifications,	Maps,
Legal Documents,	Graphs,
Cuts and Drawings for Advertising, etc.	

Manufactured by the Eastman Kodak Company exclusively for the

COMMERCIAL CAMERA COMPANY
343 STATE STREET, ROCHESTER, N. Y.

CHICAGO

NEW YORK CITY

PHILADELPHIA

PROVIDENCE

WASHINGTON

AGENCIES:

Alfred Herbert, Ltd., Coventry, England

Alfred Herbert, Paris, France

Societa Anonima Italiana Alfred Herbert, Milano, Italy

Alfred Herbert, Stockholm, Sweden

*Standard the
World Over*

"THE RACINE"

HIGH SPEED METAL CUTTING MACHINE

Reduces Blade Expense



Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

There are many ways "THE RACINE" will prove a big saving. Let us tell them to you.

Use "Racine" H.S. Tungsten Power Blades

Racine Tool & Machine Co.
Melbourne Avenue, - RACINE WIS. U.S.A.

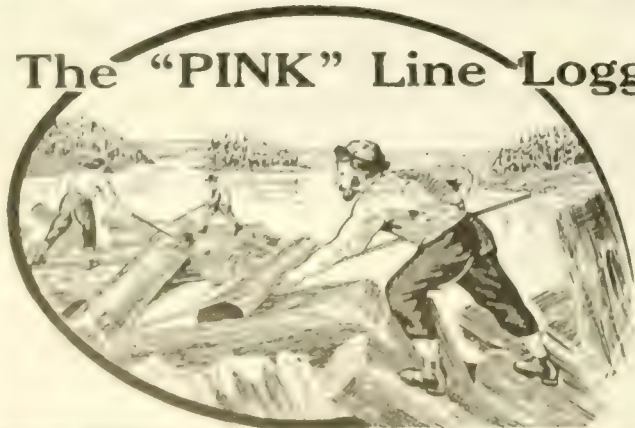
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited
ST. JOHN MONTREAL VANCOUVER

The "PINK" Line Logging Tools and Handles



MADE-IN-CANADA Products---Headquarters for British Empire for all Lumbering Tools

In every lumber camp in Canada you'll find PINK'S famous lumbering tools. They are the favorites there and have won the esteem of all woodsmen through their superior merit. They are world-renowned and are extensively used in Australia, New Zealand and other countries where the lumbering industry thrives.

EXPORTERS TO EUROPE

We export the same good quality of lumbering tools that have made PINK'S TOOLS a by-word in the matter of good tools in all Canadian lumber camps. Enquiries cordially solicited

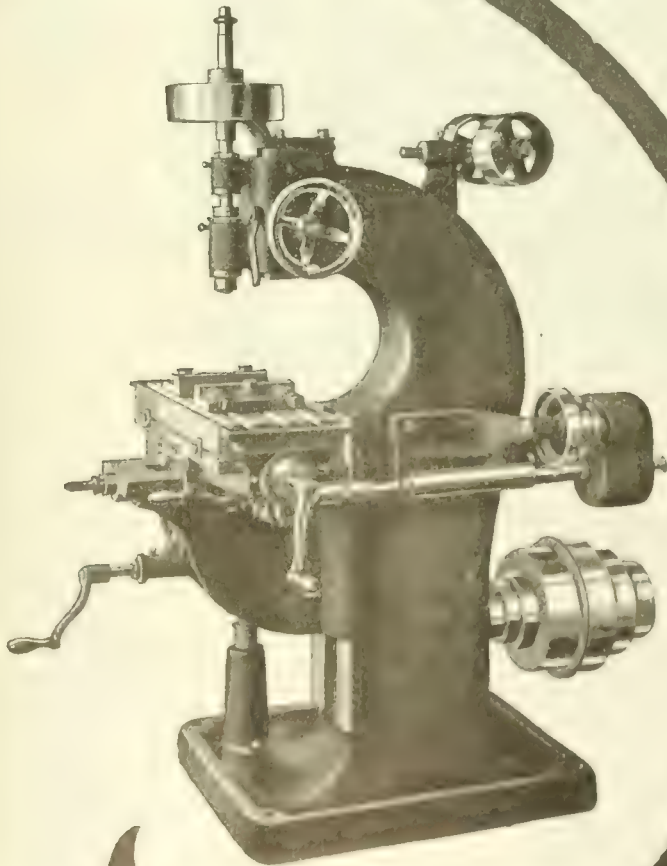
Thomas Pink Co., Limited
PEMBROKE, ONT., CANADA



BRISTOL

Bristol Vertical Milling Machine

A Tool of Large Capacity



Ball Bearings are used at the most important points making it a free running tool, which, combined with its being a belt-driven machine, makes it capable of turning out work on which an extra smooth finish is desired.

The longitudinal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

Learn all about its production capacity.

Write for bulletin giving fullest particulars.

BRISTOL MACHINE TOOL CO.
 SUCCESSORS TO C. G. GARRIGUS MACH. CO.
 BRISTOL, CONN.

If You Want Production--

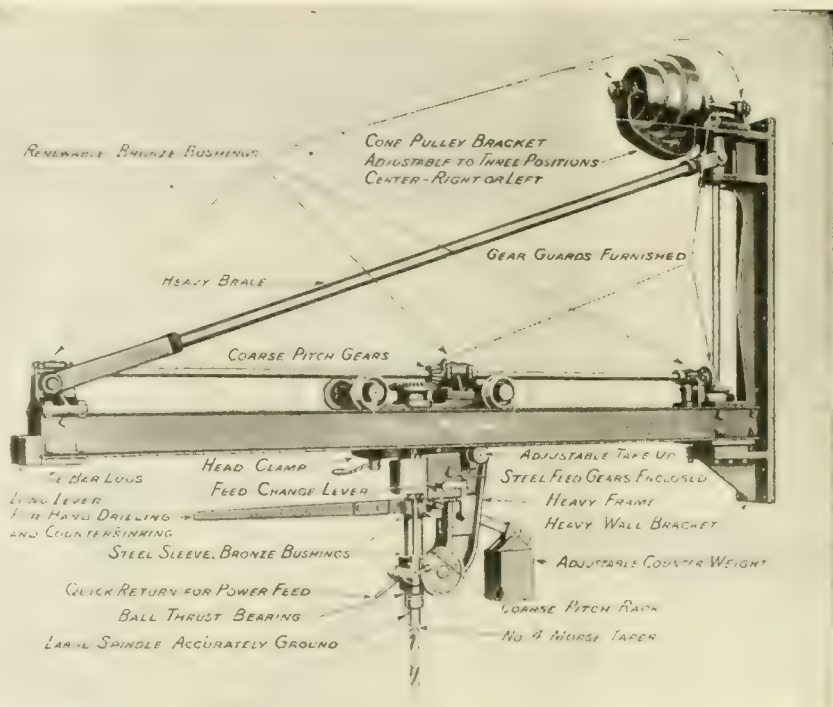
You can't do better than install this Wall Radial Drill in your plant. We'll say you won't have it in operation more than a month before you will begin to congratulate yourself on your judgment in adding this machine to your equipment. Materials and workmanship that you can depend upon to the limit are features of the construction, and our bulletin will give full details.

GET IT TO-DAY!

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue

Dept. B

BOSTON, MASS.

Built for Service

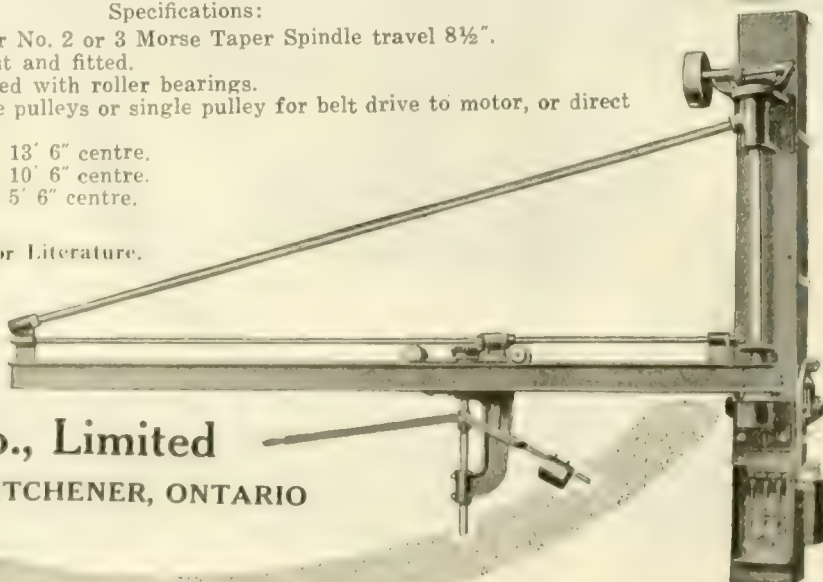
The Canadian Radial Drill is designed particularly for work in structural shops. For seaming and countersinking large surfaces such as structural shapes, boiler plates, long beams, etc.

Specifications:

- Spindle 2 3/16" diameter No. 2 or 3 Morse Taper Spindle travel 8 1/2".
- All gears accurately cut and fitted.
- Carriage wheels equipped with roller bearings.
- 14" x 14" tight and loose pulleys or single pulley for belt drive to motor, or direct connected to motor.
- 15 ft. Beam will drill to 13' 6" centre.
- 12 ft. Beam will drill to 10' 6" centre.
- 7 ft. Beam will drill to 5' 6" centre.

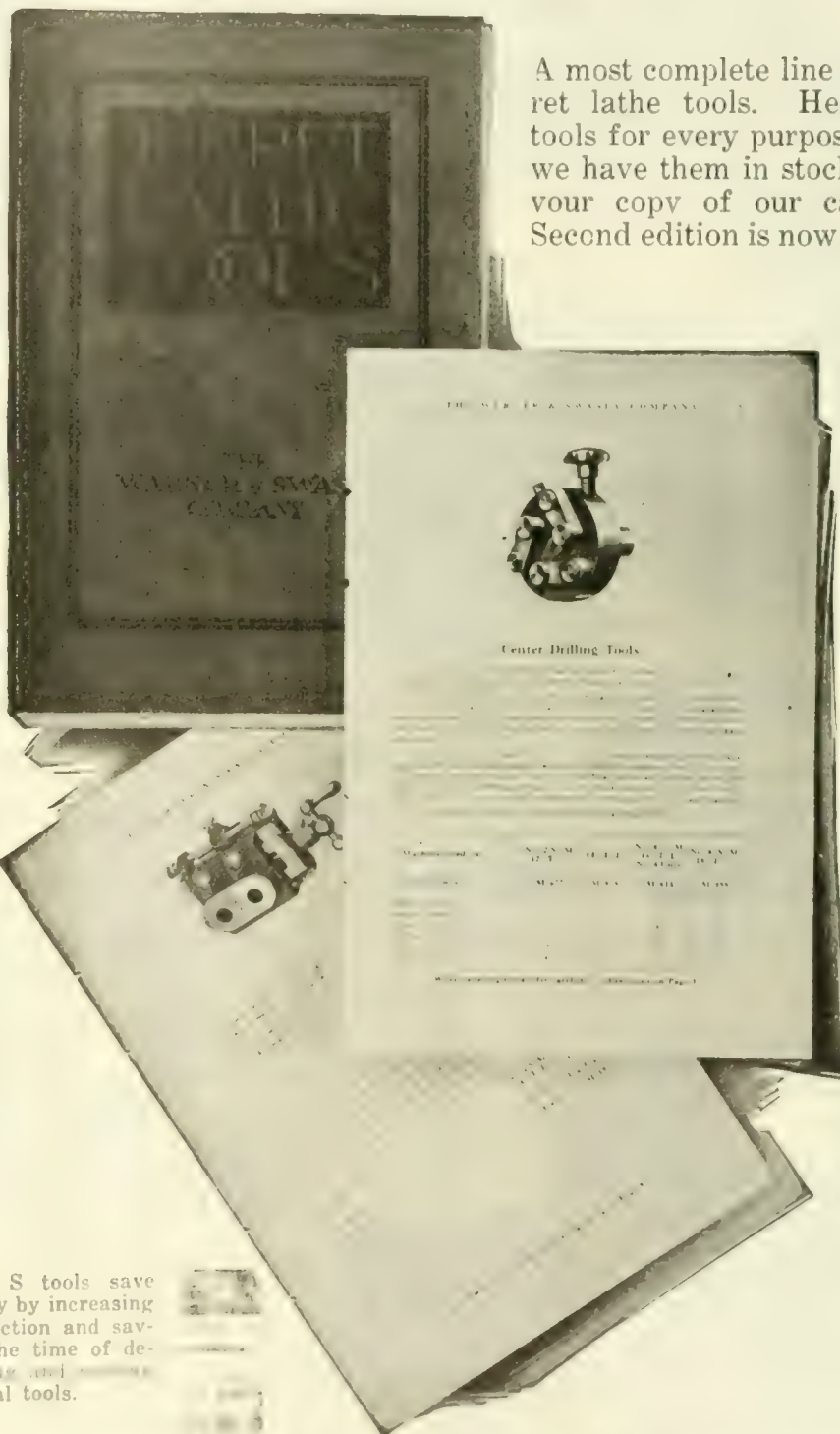
Write Dept. 16 for Literature.

**Canadian
Blower &
Forge Co., Limited**
KITCHENER, ONTARIO



Get Your Copy

A most complete line of turret lathe tools. Here are tools for every purpose, and we have them in stock. Get your copy of our catalog. Second edition is now ready.



W & S tools save money by increasing production and saving the time of designing and making special tools.

THE WARNER & SWASEY COMPANY CLEVELAND, OHIO, U.S.A.

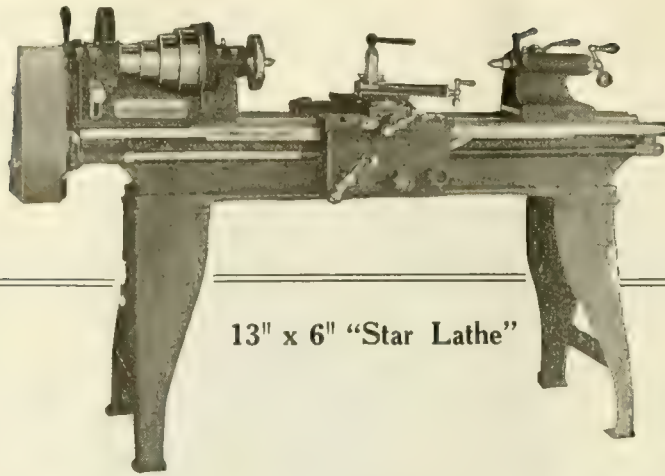
New York Office: 100 Broadway
Detroit Office: 100 Michigan Ave.

Boston Office: 100 State St.
Chicago Office and Show Rooms: 100 N. Dearborn St.

Buffalo Office: 100 Main St.
Washington, D.C.: 100 Pennsylvania Ave.

London: 100 Abchurch Lane. Manchester: 100 Market St. New York: 100 Broadway. Toronto: 100 King St. West. Boston: 100 State St. Philadelphia: 100 Market St. St. Louis: 100 Market St. San Francisco: 100 Market St. Seattle: 100 4th Ave. Vancouver: 100 4th Ave. Williams: 100 4th Ave.

"STAR" Lathes



13" x 6" "Star Lathe"

The Tool that makes Garage Work and General Repair Work more Profitable

This is a remarkably sturdy lathe for its size, and its ease of operation, handiness, and accuracy all make it an invaluable tool. It does the work of larger and costly machines at a much lower cost.

Write for our new Circular

The Seneca Falls Mfg. Company, Inc.

366 W. Falls St., SENECA FALLS, N.Y.

Would you like to have us prove that

Peerless **HIGH SPEED**

Machines do 50 to 100% more work



The Peerless has revolutionized the standard of production in so many ways that we can send you one at our expense and risk, if you agree to give it a trial run. A trial like this often results in an order from 1 to 10 machines.

The Balance Lift of the Peerless

allows you to handle the heaviest pieces. This greatly increases the output of the machine, increases power and increases production. It is the most perfect feature which we should be glad to demonstrate to you.

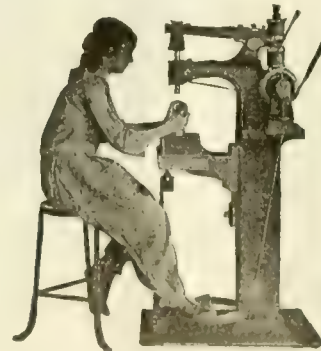
The Peerless assures you the peak of production at very lowest cost. Write for full details.

PEERLESS MACHINE CO.

1607 RACINE STREET

RACINE, WISCONSIN

The Hammer With The Human Stroke



HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:

A rivet a second, sizes up to 3/16".

A rivet in two seconds, size 1/4" to 3/8".

A rivet in three seconds, size 7/16" to 5/8".

And on special order we build machines to handle rivets up to 1 1/2" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

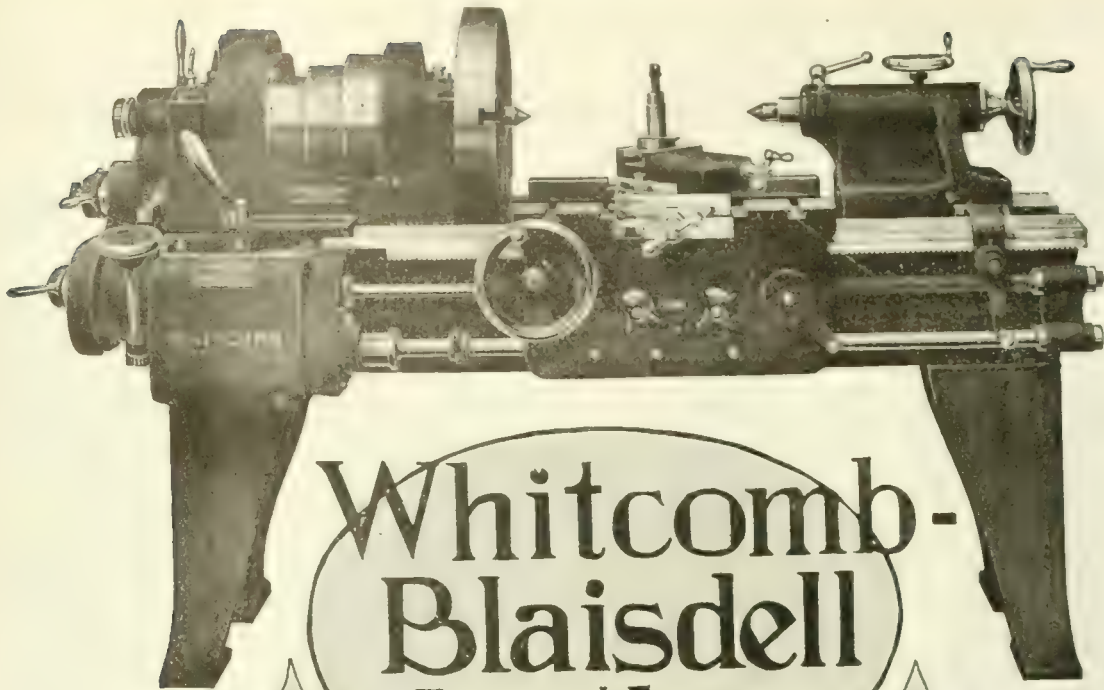
and

Let us shoulder your riveting problems.

Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.

ROCHESTER, N.Y.



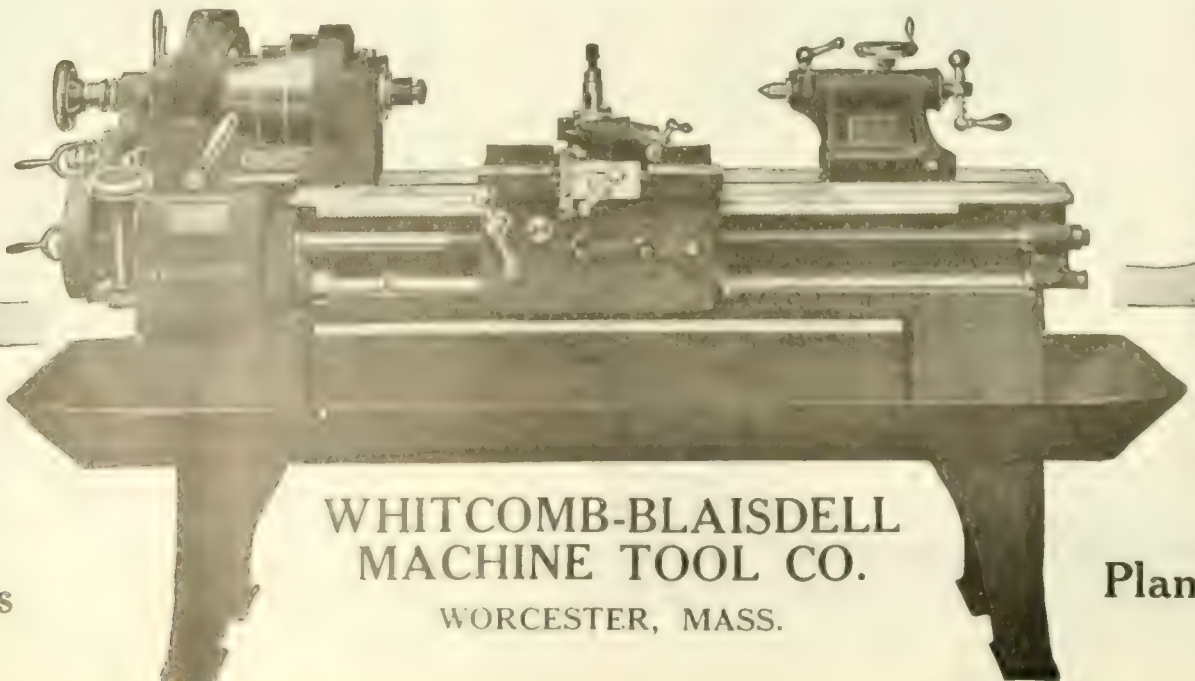
Whitcomb- Blaisdell Lathes

POWERFUL, WELL-BALANCED MACHINES THAT ARE LIGHT-RUNNING AND ADAPTED TO ALL CLASSES OF RAPID MANUFACTURING.

Every feature of the W-B Lathe of to-day has been considered from the viewpoint of greatest utility. Materials used embody toughness and durability. Our tests must prove great wearing quality and strength before any material is selected.

The product of an organization that has for sixty years been distinguished for the superior design, workmanship and material of its product

Write for our latest catalog describing all of the good features of Whitcomb-Blaisdell Lathes



**WHITCOMB-BLAISDELL
MACHINE TOOL CO.**

WORCESTER, MASS.

Lathes

Planers



"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

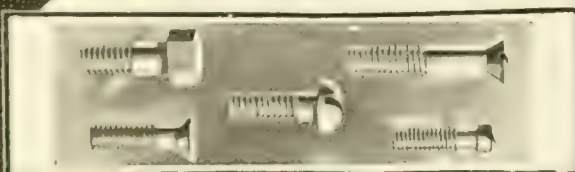
Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to $\frac{1}{2}$ " thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

Wood Screw Making Machinery

SEND FOR CATALOGUE
Series B6



For sixty years we have constantly manufactured machinery for making screws, always studying to improve and refine our product.

Write or Wire us.

Cable address: "Cook,"

Hartford, U.S.A.

Codes: Liebers

Western Union

Asa S. Cook Co.
Hartford, Conn.

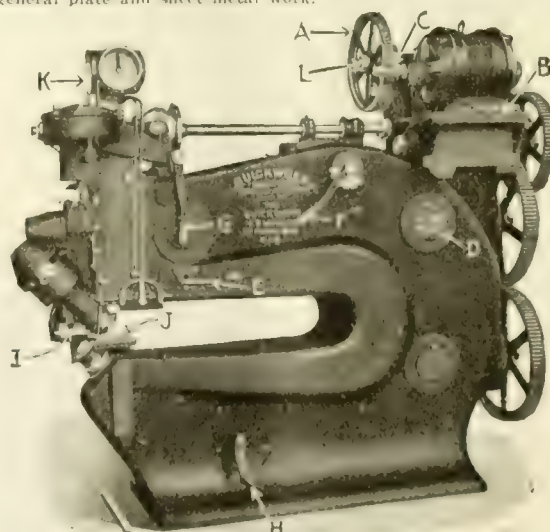
"QUICKWORK"

Registered in U.S. and Foreign Countries.

ROTARY SHEARS

MADE IN 7 SIZES.

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 2nd, 1913

SAVES 50% TO 90%

Eliminates Oxycetylene Cutting and Plate Planing.

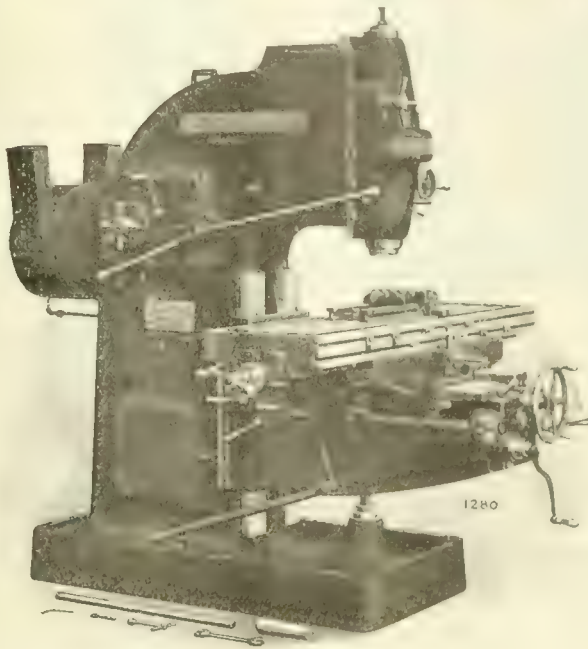
Write for Catalogue No. 60.

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

Cable address: "QUICKWORK."

Codes: W. U. and General

The New Cincinnati No. 4 High Power Vertical



Patent Rights Fully Reserved

THE CINCINNATI MILLING MACHINE COMPANY
CINCINNATI, OHIO

Intermittent feed, power quick traverse.

Square gibbing with narrow guides.

Feed changes at front of knee by one lever.

Safety couplings in feed transmissions.

Individual feed control levers.

Automatic lubrication.

Centralized oiling.

Stream lubrication.

Hardened sliding gears throughout.

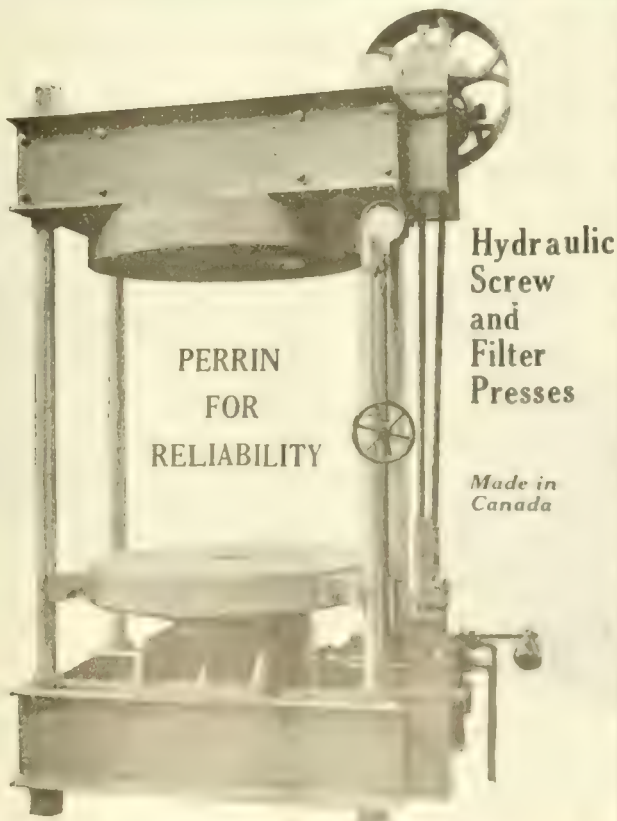
Starting lever at front.

Automatic brake.

Cincinnati standard flanged spindle end.

Spindle can run in either direction.

Ask for a catalog of the new No. 4 and 5 High Power Cincinnati Millers.



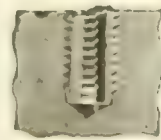
**PERRIN
FOR
RELIABILITY**

**Hydraulic
Screw
and
Filter
Presses**

*Made in
Canada*

Hydraulic Truck Presses
WILLIAM PERRIN LIMITED
TORONTO

Of What Does This Remind You?

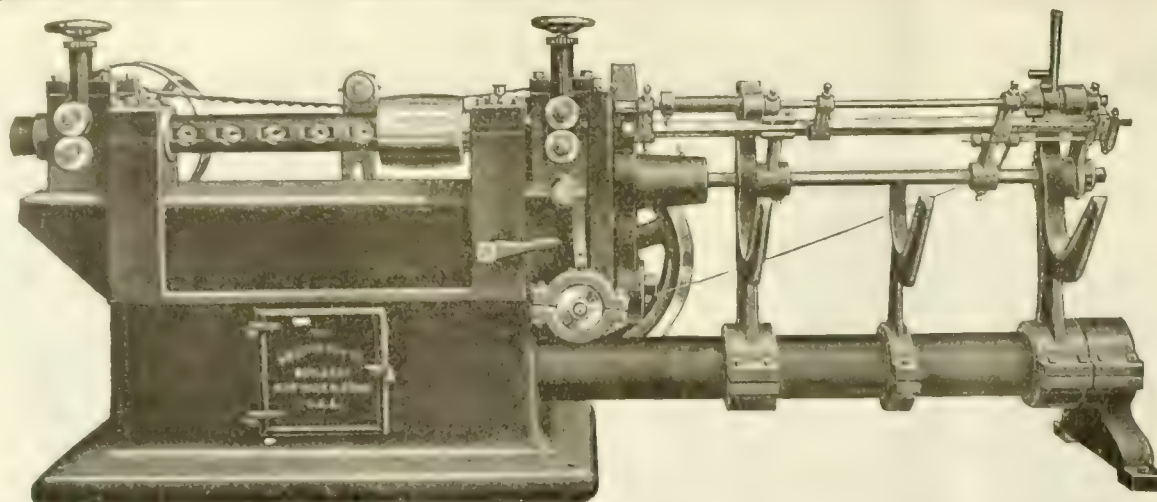


SUPPOSE that you had on hand when your last tap was broken a commercial device built specially to remove the broken pieces of tap, a commercial device not a home-made article, would you not have saved a great deal of time?

Write us for information.

The Walton Company

310 PEARL STREET HARTFORD, CONN.



Perfect Wire Straightening Quickly and Profitably Done on Our Automatic Wire Straightening and Cutting Machine

Just put your coil of wire on the reel, adjust the rolls and dies, and set the gauge for the length you want. The machine does the rest—thousands of feet per day, perfectly straight and cut to accurate lengths.

Catalogue tells more about them, and we will be glad to send you a copy.

THE F. B. SHUSTER CO., New Haven, Conn.

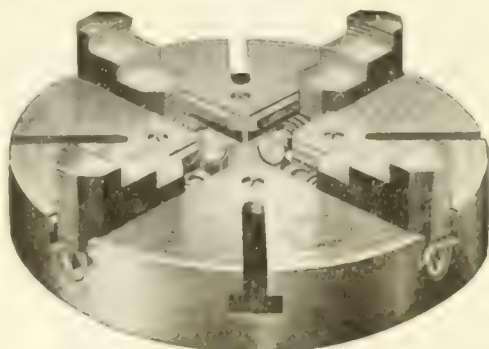
FORMERLY JOHN ADT & SON

ESTABLISHED 1886

ALSO MAKERS OF STRAIGHTENERS FOR SQUARES, HEXAGONS, FLATS, ETC.

ALL STEEL INDEPENDENT CHUCKS

are not an experiment—they have come to stay. They are a necessity with the modern machinery and high-speed steel cutting tools.



THE UNION STEEL BODY CHUCKS

are well designed and have all the elements of strength and durability for which they are designed. We make other types in steel also, including the Geared Scroll Chucks and the Geared Scroll Combination—all designed for heavy work and hard usage.

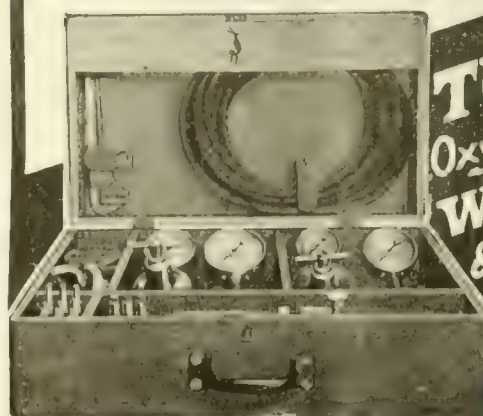
UNION MANUFACTURING COMPANY

New Britain, Conn.

New York Office: 26 Cortlandt Street

Makers of a complete line of chucks

For Repairing Broken Machinery or Tools of Medium Size



TURNER
Oxy-Acetylene
WELDING
& **CUTTING**
Equipment

These outfits will soon pay their cost in machine parts or tools reclaimed. The sectional extensions of the torch enable the operator to adjust it to any desired length or angle. The location of valves is such that the flame is controlled by one hand, leaving the other hand free for the work at all times.

For full particulars write

The Turner Brass Works
SYCAMORE, ILLINOIS, U.S.A.

RICKERT - SHAFER TAPPERS

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on $\frac{5}{8}$ -in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.

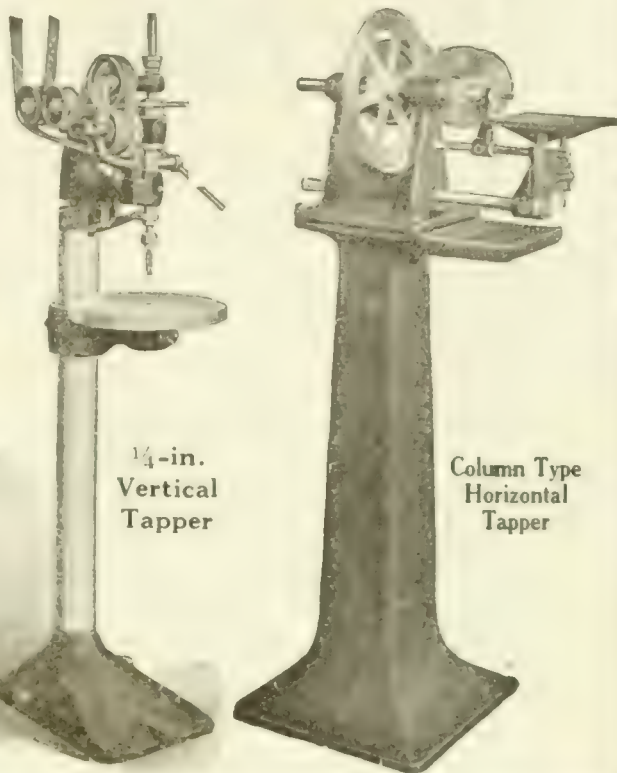
Write for specifications

The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England.

Save Tap Breakage



14-in.
Vertical
Tapper

Column Type
Horizontal
Tapper

PURE OXYGEN

Save money by using

Electrolytic Oxygen
99.80 Pure

Write for particulars and prices, also samples gladly given for testing purposes.

We also handle Pure Acetylene.

Carter Welding Co. of Toronto
LIMITED
7-11 Sheppard St.

IMPERIAL CARBIDE



For
Welding
Cutting
and
Lighting



It insures **effective-
ness and economy** by
invariably producing
acetylene gas of **un-
usual purity.**

Manufactured by

Union Carbide Co. of Canada, Ltd.

Head Office:
Dominion Bank Bldg.
TORONTO, ONT.

Works:
WELLAND
ONT.

Large Stocks maintained at convenient distributing
centres throughout Canada

One Short Year Ago—

GO back a year—in memory.

Then we *hoped* to win.

We believed we would win.

We were willing to spend every cent in Rock Island for Victory.

Every man, woman and child in Rock Island was prepared to pay any price if only we could achieve Victory.

If you were asked to *give* to the Victory Loan 1919 you should do it in the thankfulness for Victory.

BUT you are not asked to give—only to *lend* your money.

—On the best security in the world.

—At a good rate of interest.

If every citizen of Rock Island will make it his duty to support to the utmost of his ability the Victory Loan 1919 we can gain such a reputation for Rock Island as will astonish all Canada.

The money is here.

Why not make this a record?

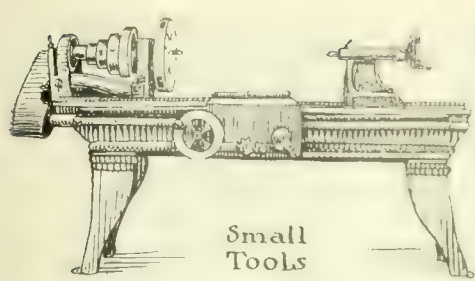
All together, now!

Buy Victory Bonds

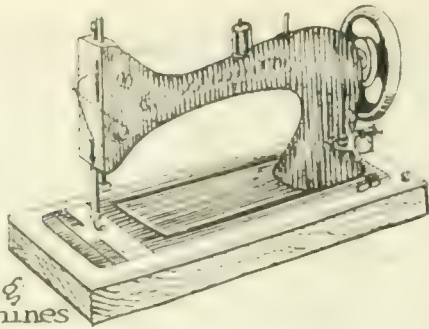
This Space donated to the Victory Loan 1919 Campaign by

Butterfield & Company, Inc. - Rock Island, Quebec

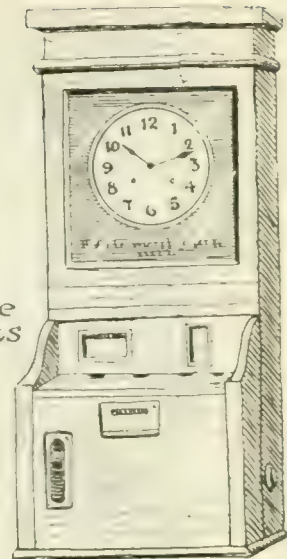
Toronto Office: 220 King Street West



Small Tools



Sewing Machines



Time Clocks

It's Made for YOUR Work

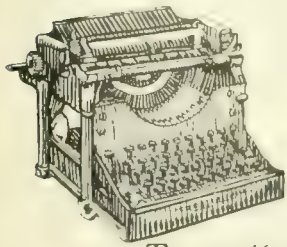
Leading manufacturers of scores of different kinds of light machines are of the opinion that the Bilton Gear Miller was designed for their individual needs.

It so speedily and accurately produces spur and bevel gears and worms, and the countless small irregular parts that enter in the makeup of your product, that you cannot be blamed for thinking it was built for your special use.

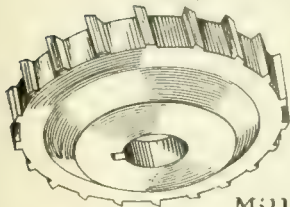
It is a valuable addition to your tool room for producing small milling cutters, reamers, etc.

If production increase interests you, our circulars will make pleasant reading; better put in that request to-day.

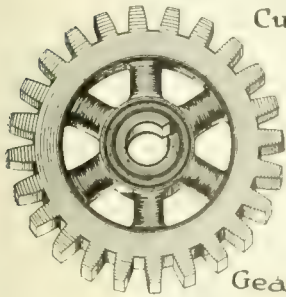
Ask for copy of Catalog No. 30



Typewriters



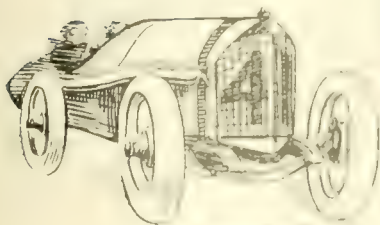
Milling Cutters



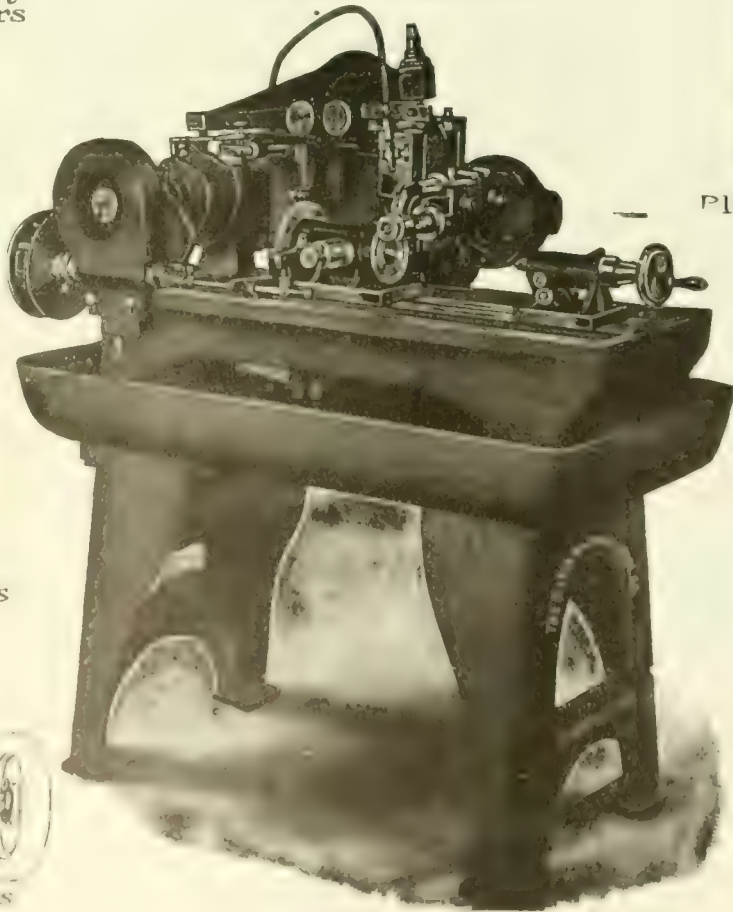
Gears



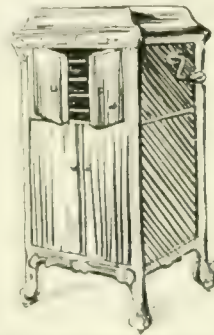
Speedometers



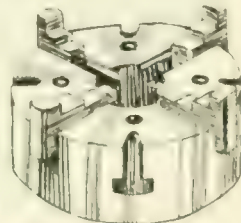
Automobiles



Locks



Phonographs



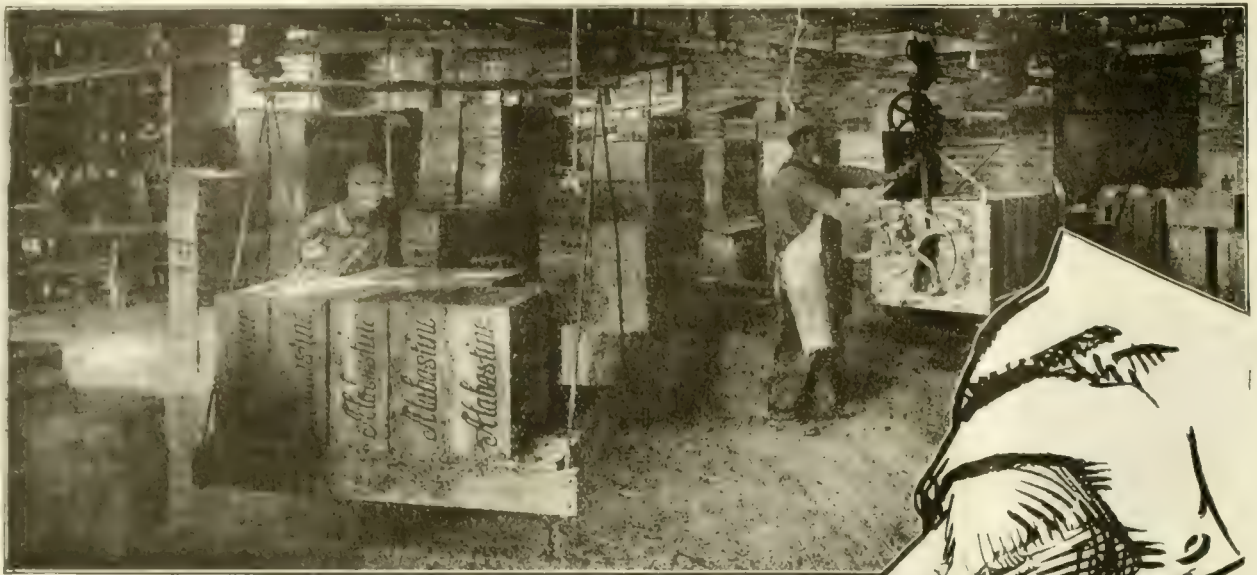
Chucks



Motorcycles

BILTON MACHINE TOOL COMPANY

Housatonic Avenue, BRIDGEPORT, CONN.



Eliminates One Man In Three

A large percentage of the labor in your factory, foundry, warehouse or whatever some point may be, is employed in **moving material**. From bench to bench, department to department, shop to shop, tank to tank, vat to vat, some men are spending their time conveying your product or some component of it, from one place to another.

By actual test, we have found that an overhead conveyor outfit saves the wages of one in every three men who are engaged in this work. A man can move more, move it faster, load it more safely, unload it more safely, get through his work more efficiently when he has no floor conditions to bother about. Much heavier loads are handled at a time with far less wear. In these days of high wages, every man saved makes a big difference.

BT
TIME SAVER

BT Overhead Conveyors

BT
TIME SAVER

Our system does include certain types of conveyors which we have found of general utility in various plants. In addition our men, in a liberal position, to design a conveyor suited to your special needs. Our track and fitting are adaptable to all conditions and remarkably easy to erect. Just how your plant can be equipped will be cheerfully explained to you if you will express your interest. No obligation attached to your inquiry.



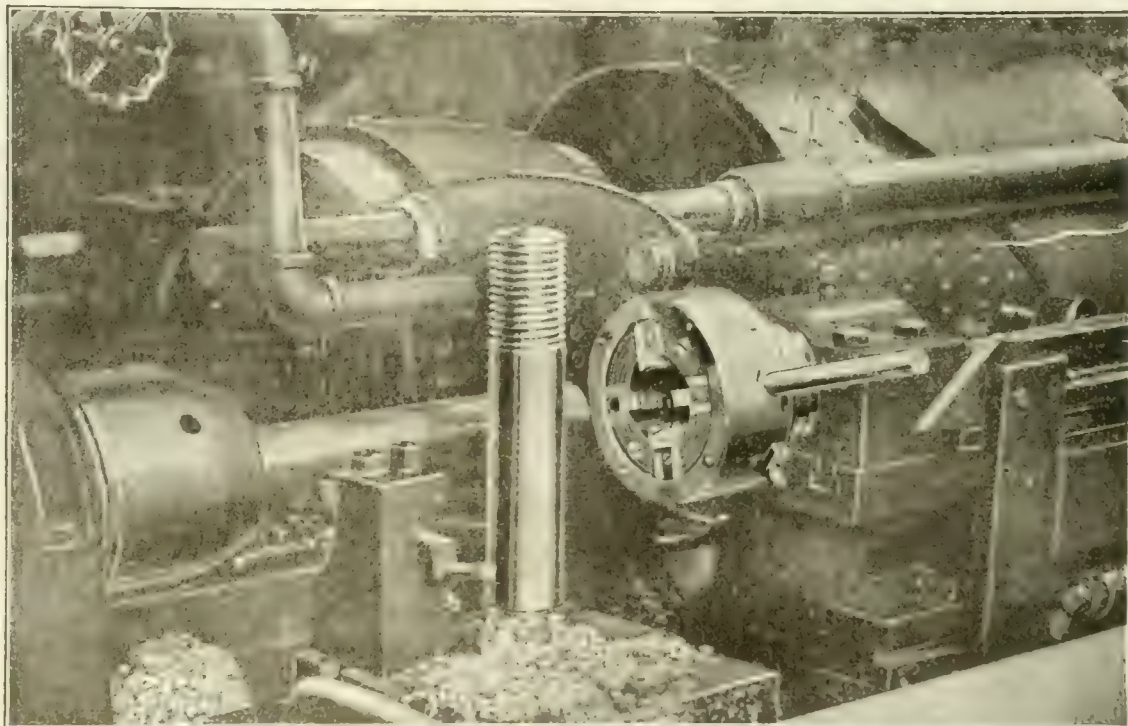
Beatty Bros., Limited

Head Office, Fergus, Ont.

Branches at Winnipeg, Man., Edmonton, Alta., Montreal, Que. and St. John, N.B.

MODERN

Self-Opening Die Heads



This Modern Saves 60% Time

With this No. 5 Modern the National Transit Pump and Machine Company, Oil City, Pa., is cutting $1\frac{1}{2}$ inch No. 6 pitch, U.S. threads, three inches long, in one operation. Same work formerly required two and three cuts. Total time, including cutting off, is $23\frac{1}{4}$ minutes. The superintendent estimates the actual saving at 60% of former time consumed. Illustration shows Modern Self-Opening Die Head as mounted on Cleveland Automatic.

Nearly every shop has a job in which Moderns can make big savings. Give us the data on your job and we'll furnish the evidence of Modern's capability on your work. Send for complete technical bulletin.

MODERN TOOL COMPANY, ERIE, PA.

Main Office and Works: State and Peach Sts.

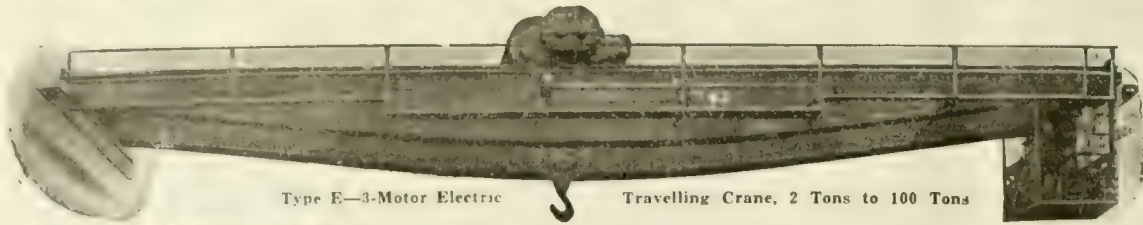
BRANCH OFFICES

New York, N. Y., 1 Rector St.	Chicago, Ill., 42 N. Clinton St.
El Paso, Mex., 10 E. First St.	Cincinnati, Ohio, 2 Greenwood Office Bldg.
Cleveland, Ohio, 611 Guardian Bldg.	Export Dept., 2 Rector St., New York City.
Superior Agents: Ross-Bellevue Machinery Co.	Toronto and Montreal
California Representatives: Barbours Machinery	& Supply Co., Los Angeles and San Francisco.

CANADIAN MADE

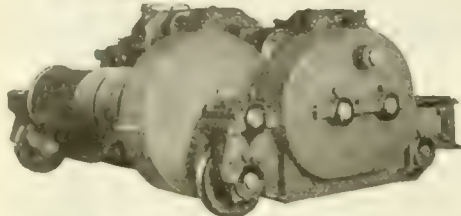
CANADIAN MADE

Electric and Hand Traveling Cranes

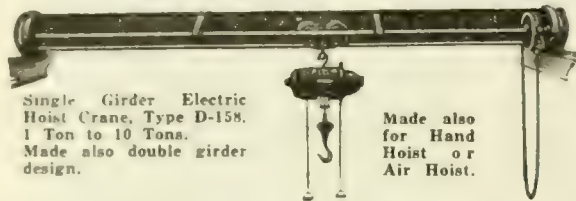


Type E-3-Motor Electric

Travelling Crane, 2 Tons to 100 Tons



Northern Type E Crane Trolley, Rigid, Enclosed Construction. Patented in Canada.



Single Girder Electric Hoist Crane, Type D-158. 1 Ton to 10 Tons. Made also double girder design.

Made also for Hand Hoist or Air Hoist.

We make a wide range of CRANE and HOIST designs. All sizes and capacities, 1 ton to 100 tons.

Get our prices and specifications before you buy.

In asking prices, state SERVICE, CAPACITY, SIZE OR SPAN POWER, and, if electric, KIND OF CURRENT.

Catalogs free.



Type D Electric Hoists — ½ to 10 Tons.

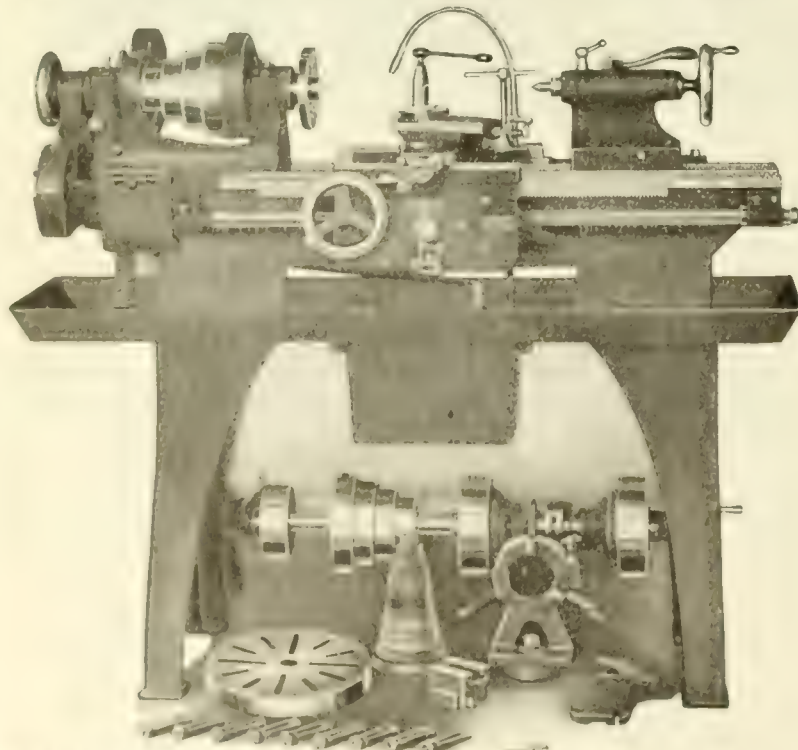
Air Hoists, Trolleys and Tracks.



Type No. 29 Air Hoist.

Northern Crane Works, Limited
Walkerville, Ontario, Canada

WORCESTER LATHES



12" and 14" Swing
Cone or Geared Head
Single Pulley or Motor
Drive.

WORCESTER LATHES are especially noteworthy for light tool-room work and are particularly adapted to it because of their accuracy and the small floor space which they require.

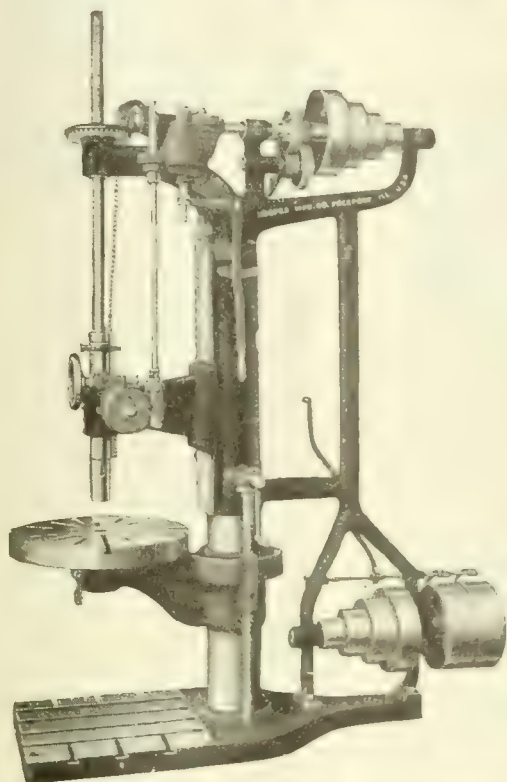
In addition to our usual tool-room equipments as shown in illustration, we can also furnish the following: Semi-automatic Turret on Shears, Four Tool Post, Automatic Lateral Feed Stop and Milling Attachment.

*Write for Complete
Information*

WORCESTER LATHE CO., WORCESTER, MASS.

The Driller for Exact Work

HOEFER



Enable Your Workmen to Eliminate Spoilage

The Hoefler Driller is pre-eminently the one to be found in the best plants. "It's almost as good as a Hoefler," so often heard in the machine and tool trade, indicates the position held by Hoefler Drillers.

Exact drilling, to the last thousandth of an inch, pays by eliminating spoiled material. Hoefler Drillers pay for themselves and increase the workman's pride in his work.

Twenty-five Years on Market

Twenty-five years making drillers has given Hoefler the "Know-how." The Hoefler Drillers are used by many of America's leading manufacturers. Equip your factory the Hoefler way. Take any kind of a drilling problem you have to the Hoefler Manufacturing Company, and the Company's experts can tell you how it was solved by other men, some of whom you may know.

Investigate now. Write to-day for catalog. The Hoefler engineers are at your service.

HOEFER MFG. CO.

FREEPORT, ILL.

MANHATTAN

UNIVERSAL Grinder



A tool that stands in first rank in machine design and machine utility.

If you have a grinding wheel, there's no other machine that can do the work as well as the Manhattan.

MANHATTAN MACHINE & TOOL CO.

Foreign Representatives: The Largest Machine Co. in the World, Ltd., London, E.C.

Speed With Safety

You can't overspeed a Tribloc. It is built to work safely and dependably at any speed.

THE LOOP HAND CHAIN GUIDE, exclusive with the Tribloc, makes it possible to load and unload the Tribloc without the use of a crane or derrick. It is a safety feature, preventing "jamming" of the chain in the hook.

It also keeps the Tribloc from overloading the frame of the barrel wheel.

Most of our men are experienced and intelligent and intelligent.

Ford, Block & Chain Mfg. Company

1000 Broadway, New York, N.Y.

FORD TRIBLOC

Lacing the Belts of Industry



THE Clipper Belt Lacer is to-day depended upon for keeping belts repaired and moving in 100,000 of the leading industrial plants of the world. Year after year its simplicity, economy and effectiveness have commended it to more plant managers, so that now Clipper Belt Lacing Service has become an institution—a part of the equipment of up-to-date manufacturing establishments.

Less speedy and dependable means of repairing broken power belts would mean, in a big plant, incalculable loss. Antiquated methods that take from fifteen minutes to half an hour to repair a joint are too expensive for any plant.

The Clipper Belt Lacer Laces a Belt in Three Minutes

Besides mending a joint quickly, the Clipper does the job well. The belt is permanently repaired. It is smooth and flush on both sides, pulls as it should, and is safe. A Clipper-laced joint strengthens the belt at a weak point.

The Clipper lacing tool is so simple that any shop workman can use it. No experts required. The cost of mending belts with the

Clipper is negligible.

Your plant may to-day be using Clipper Belt Lacing methods, but

may not be equipped with a sufficient number of Clipper tools.

Most big plants make their Clipper service 100% efficient by keeping Clipper tools convenient to every battery of machines for emergency use when a belt breaks.

The American Museum of Safety has expressed its opinion of the Clipper Belt Lacer by awarding it the only gold medal ever given for metal lacing.

To manufacturers who have not had satisfactory belt repairing service, the Clipper is recommended with confidence. It goes to them on free trial and is backed by a permanent guarantee.

The Clipper is sold by mill supply houses.

*European Trade supplied through London Office
Distributors in all parts of the world.*

Clipper Belt Lacer Company

GRAND RAPIDS, MICHIGAN, U. S. A.

LONDON, ENGLAND

No. 10 NORFOLK STREET

Cut Your Cutting-
off Costs in
HALF

HURLBUT'S

Patent Cutting-off and
Centering Machines

TO say that the Hurlbut, Rogers Cutting-Off and Centering Machine will double your production and cut your costs in half may seem like a broad claim. But this is just what this machine will do compared with any ordinary machine of its kind.

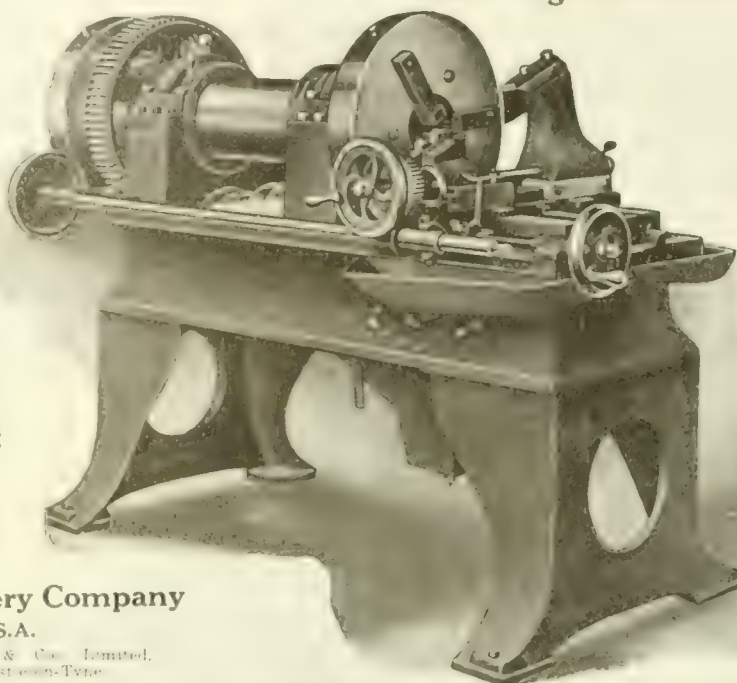
Hurlbut, Rogers speed and efficiency is easily explained. Instead of only one, it is equipped with two cutting-off tools—one cutting up and the other down. In this way they hold the work against each other and finish a job in just half the time and do twice the work.

You can't afford to be without this machine. It saves real money. Let us tell you more about it. Write!

The Hurlbut, Rogers Machinery Company

South Sudbury, Mass., U.S.A.

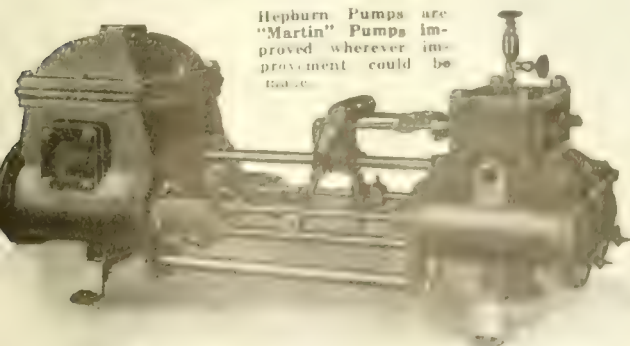
Foreign Agents—England: Chas. Churchill & Co. Limited,
London, Manchester, Glasgow and Newcastle-on-Tyne.



Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.

Hepburn Pumps are
"Martin" Pumps im-
proved wherever im-
provement could be
made.

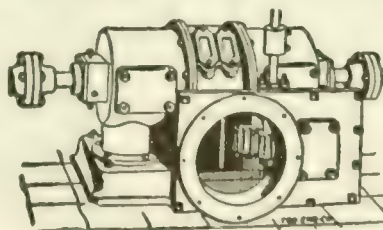


JOHN T. HEPBURN, LIMITED

18-60 Van Horne Street

Toronto, Ontario

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

THE J. C. WILSON MFG. CO.

LIMITED

BELLEVILLE, ONTARIO

Gear Cutting With The "IFS" Left Out

The Gear Shaper Way

A production manufacturer knows that he will secure good gears IF he has an accurate cutter, an accurate machine and a machine working on the correct principle. The whole question of good gears is resolved in this one little word "IF."

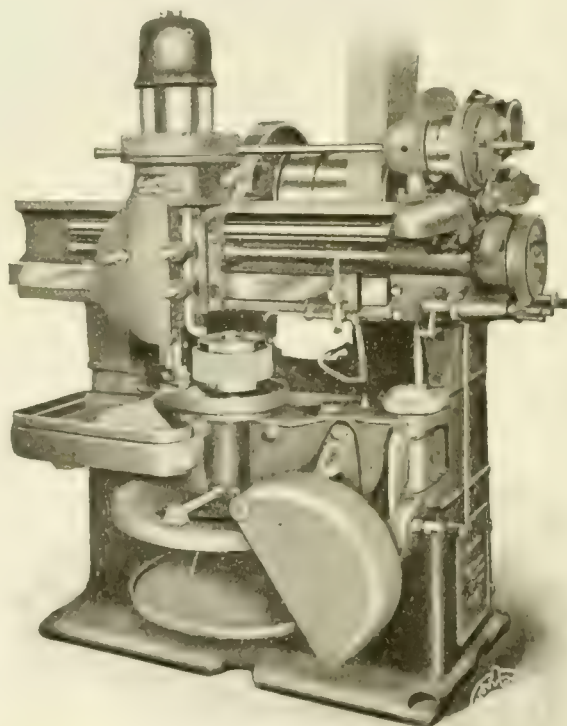
When the Gear Shaper was originally designed, the question of "IF" was taken into consideration and every possible means known to mechanical engineering was employed to eliminate the "IFS" from gear cutting.

That we have been successful in solving the problem is evidenced by the fact that each ensuing year sees a larger number of manufacturers adopting the Gear Shaper method.

How the Gear Shaper has accomplished this is clearly explained in our general catalog "Commercial Gear Cutting," which is a treatise on the subject of:—

Gear Cutting with the "IFS" Left Out.

Send for your copy to-day.



The Fellows Gear Shaper—the machine which has taken the "IFS" out of gear cutting.

The Fellows Gear Shaper Company

Springfield, Vermont, U.S.A.

FOREIGN AGENTS: Alfred Herbert Limited, Coventry, England; Societe Anonyme Alfred Herbert, Paris, France; Societa Anonima Fabbrica Macchine, Milan, Italy; Alfred Herbert Limited, Yokohama, Japan; Societe Anonyme Alfred Herbert, Barcelona, Spain; Alfred Herbert, Brussels, Belgium; Alfred Herbert Limited, Calcutta, India; A. B. Galeo, Limited, Stockholm, Sweden.

ONE OF THE = MANY WAYS

NAMCO TAPS ARE ADAPTED

Four NAMCO Taps at one time on
a Four Spindle Drill Press—

That's the method employed in tap-
ping motor valve ports by one
manufacturer of high grade auto-
mobiles.

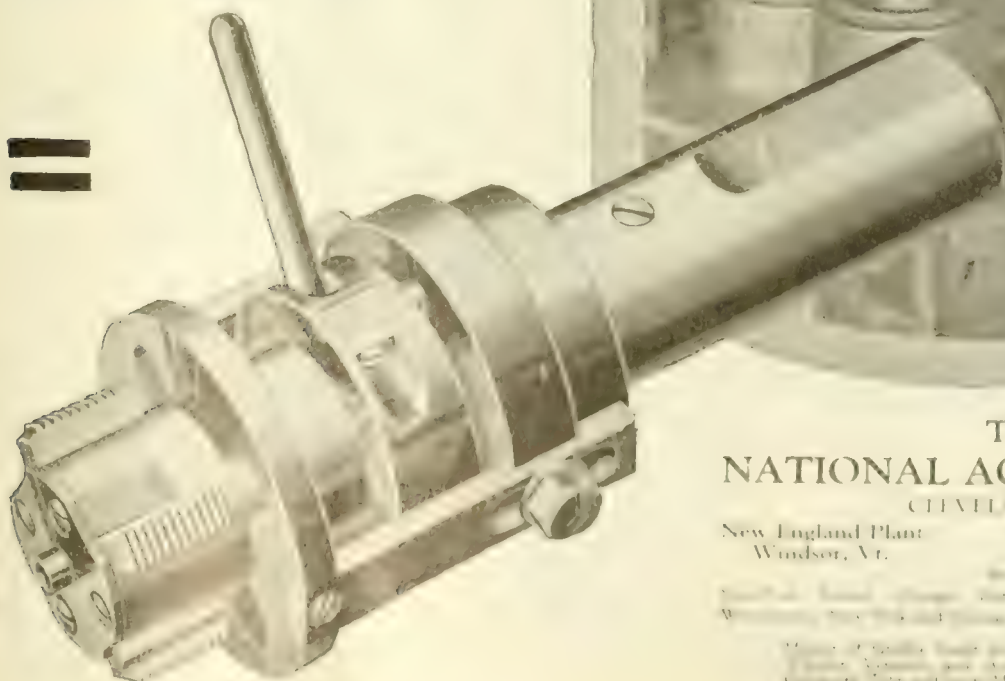
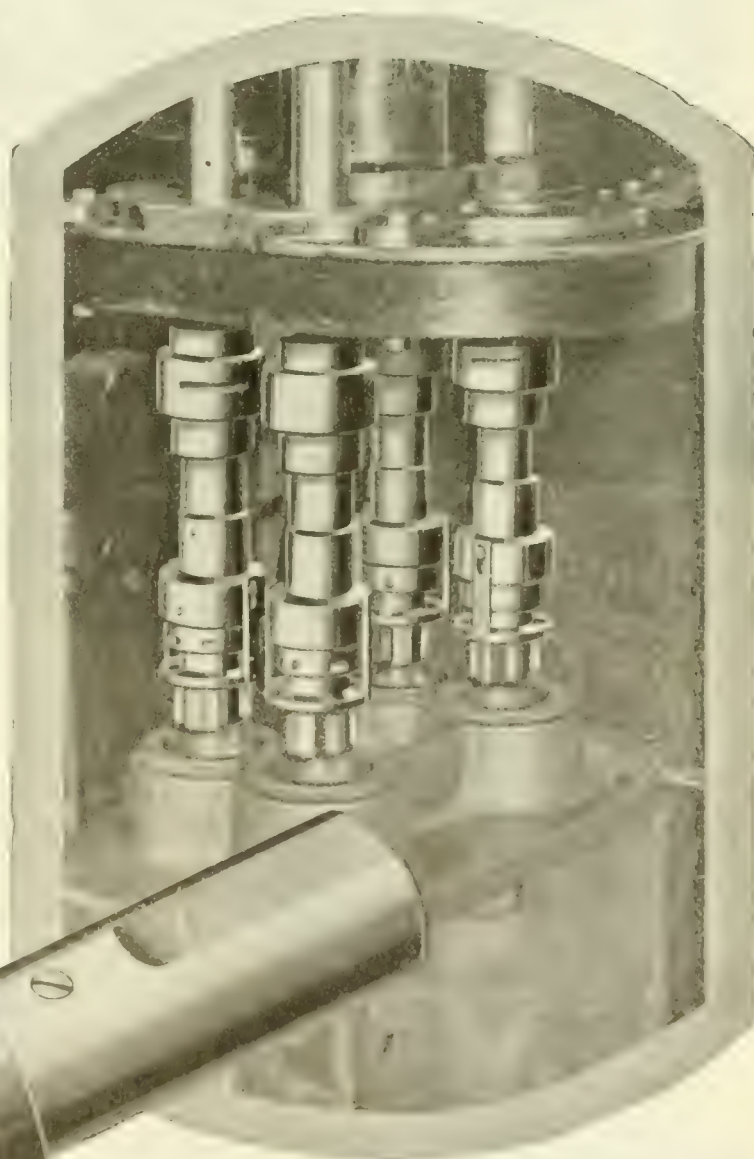
In this case adaptability results in a
substantial increase in production.

Moreover the simplicity of design
and rigid construction of NAMCO.
Collapsing Taps results in—

First—Lower costs per hole
tapped.

Second—An output that is
interchangeable.

Ask for thread cutting catalog
"Dies and Taps."



THE
NATIONAL ACME COMPANY
CLEVELAND, OHIO

New England Plant
Windsor, Vt.

Canadian Screw Plant
Montreal, P. Q.

Sole U.S. Agents: The National Acme Company, Cleveland, Ohio
Sole Canadian Agents: The National Acme Company, Montreal, P. Q.

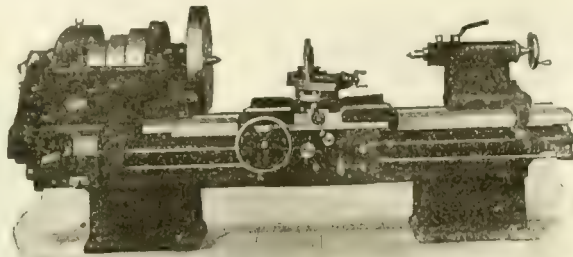
Manufacturers of Dies, Taps, and Machine Tools. Also
Manufacturers of Dies, Taps, and Machine Tools. Also
Manufacturers of Dies, Taps, and Machine Tools. Also

*Sidney
for
Service*

**Heavy
Duty
Engine
Lathes**

SIDNEY

Sidney-for-Service Lathes are noted for their power and rigidity. Take deep cuts through toughest metal without pause or chatter.



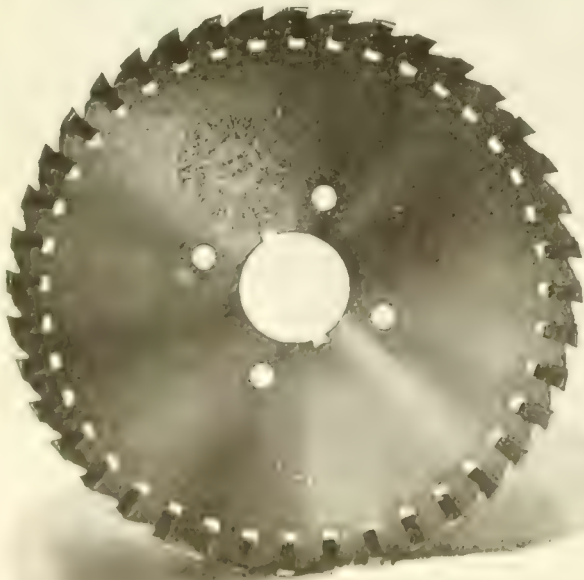
Specifications include 3-step cone, double brake gear, semi-quick change gear lathe, built on 10 ft. bed. This lathe also furnished with quick-change gears. Bed lengths available: 10, 12, 14, 16, 18 and 20 ft.

The Sidney Line comprises 15-inch, 17-inch, 19-inch, 25-inch, 27-inch, 30-inch and 36-inch lathes, which are adaptable to the finest tool room work or the heaviest duty shipyard or factory rapid production work.

The Sidney Tool Company, Sidney, Ohio

Canadian Agents: Yeates Machinery & Supply Co., Montreal, Que.
H. W. Petrie, Limited, Toronto, Ontario

THE IMPROVED TAYLOR-NEWBOLD



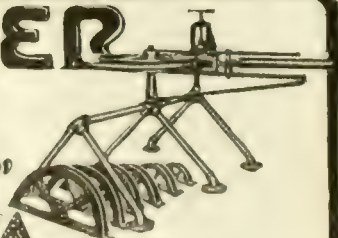
INSERTED TOOTH COLD SAW

MACHINE FOR CUTTING STEEL

Tabor Mfg. Co., Philadelphia, Pa., U.S.A.

WONDER

"Bending
Machines"



**Bend Pipe
Cold**

Eliminate Friction

3 New Models

"Wonder" Pipe and Tube Bending Machines (pat.) electrically operated to bend from 1" to 18".

We also manufacture
10 OTHER SIZES

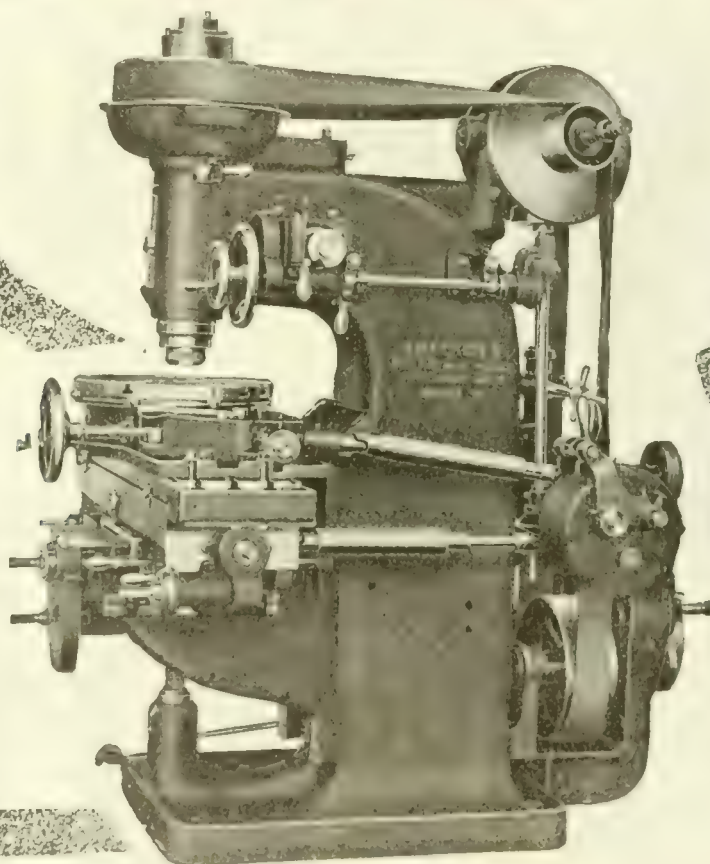
Hand operated to bend from 1/8" to 8".

Send For Printed Matter

**American
Pipe Bending Machine
Company**

50 Pearl St., Boston, Mass., U.S.A.

Becker



**“Becker
Belt Driven
Millers”**

*The Machine
that gives the
Smooth Finish*

**Model
B**

The machine shown above is a Becker Model B Belt Driven Miller—Like the other machines of this line it is a Production Tool of the first class, embodying all the features that have made Becker Millers the standard.

The strenuous period of war work has introduced Becker Belt Driven Millers into Canadian factories. They were essential then because they greatly increased production without adding to manufacturing costs—and now, they are essential also because they will enable you to reduce your manufacturing costs in order to cope with the keen after-war competition.

You need a Becker Belt Driven Miller.

Write for Circular O-501—NOW

BECKER MILLING MACHINE COMPANY

Hyde Park, Boston, Mass.

Canadian Agents:

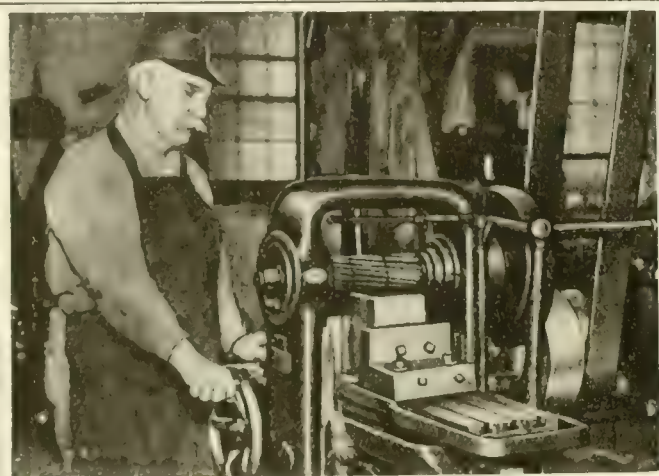
Rudel-Belnap Machinery Company, Ltd., 137 McGill St., Montreal.

A. R. Williams Machinery Company, Ltd., 64 Front St. West, Toronto.

BRIGGS

MILLER

*Keeps Five Die
Sinkers Going*



HERE you see the Briggs Miller Squaring Die Blocks, and it is working so fast it keeps five die sinkers going.

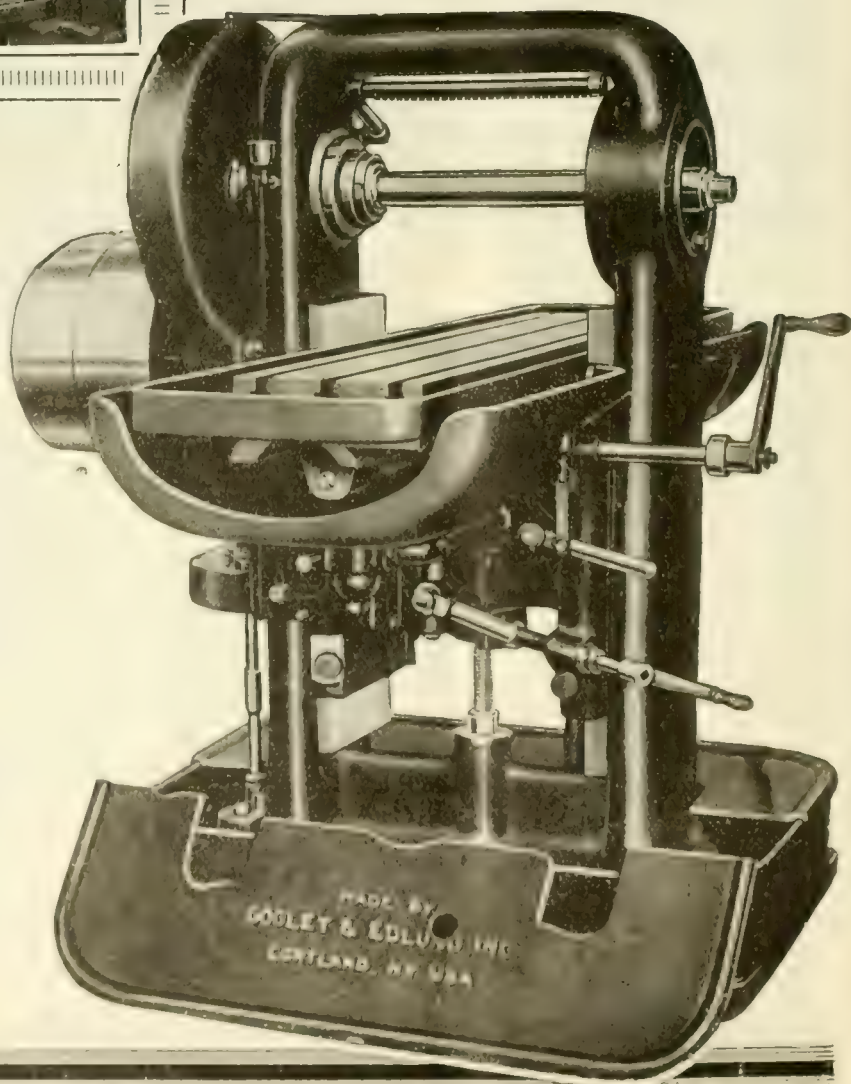
Some are new, squared from the rough; some are old, annealed, cut down and made over; some are oblong, some square, in sizes up to 9 inches. This Briggs Miller has been squaring blocks for four years; has never given any trouble. When cutters get dull the operator has another gang ready to go on with the work. Unusual rigidity accounts for Briggs' higher efficiency.

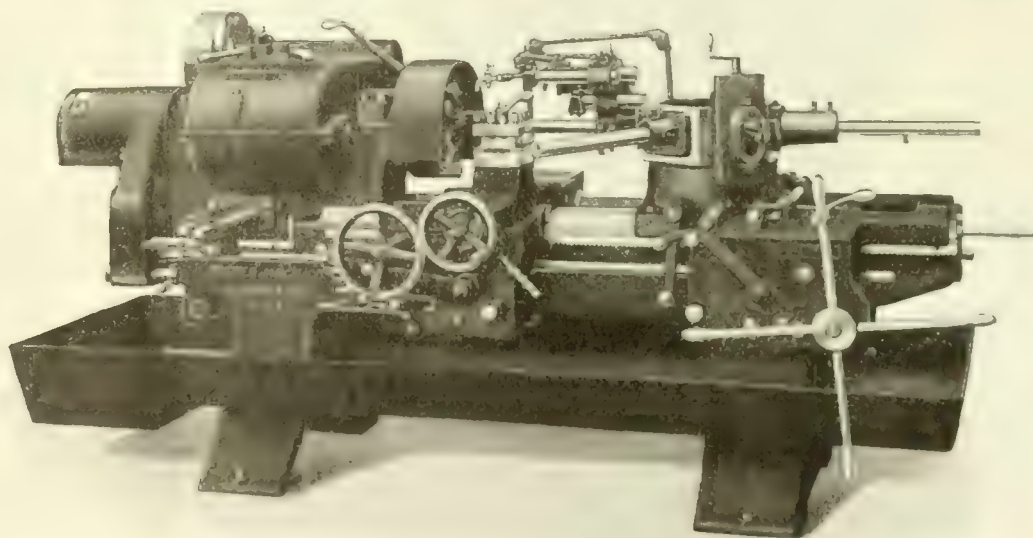
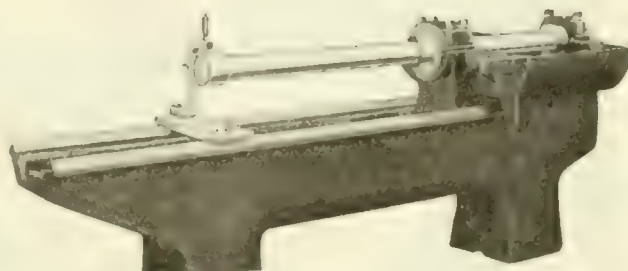
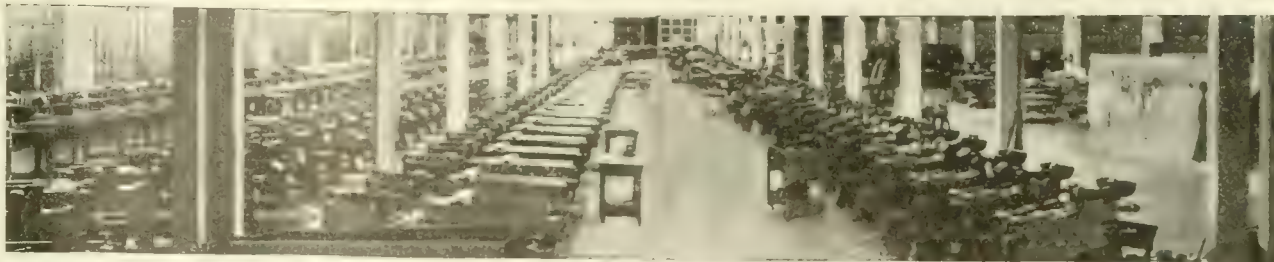
Don't you think you could use this tool to advantage in your shop? Write for the details.

Gooley & Edlund, Inc.
Cortland, N.Y., U.S.A.

Garlock Walker Machinery Co., Ltd.
Toronto, Ont.

Williams & Wilson, Ltd., Montreal





THE HIGH COST OF A BREAKDOWN

Ask your chief cost clerk how much that breakdown cost you in dollars and cents. He will tell you that the operators' wages amounted to so much; the machine charges so much; floor space so much and general overhead so much.

But your factory superintendent will tell another story: He knows that the breakdown of a machine is liable to throw the continuity of flow of production entirely out of gear. The machine performing the second operation on the piece may have to stand idle for lack of work while the breakdown is being repaired. The assembly department may have to stand idle for lack of finished parts.

QUALITY IN A MACHINE TOOL IS AN INSURANCE AGAINST BREAKDOWN.

You buy quality when you buy a Foster Universal Turret Lathe.

Quality means that—

1. The design of the machine is correct.
2. The right material is used for each individual part in the machine.
3. The workmanship entering into the building of the machine is of high character.
4. The proper heat treatment is given to all parts requiring such.
5. Every machine is inspected and tested thoroughly before leaving the factory.

We have a booklet entitled "FOSTER QUALITY," descriptive of our methods and equipment. It will interest you.

Write for it

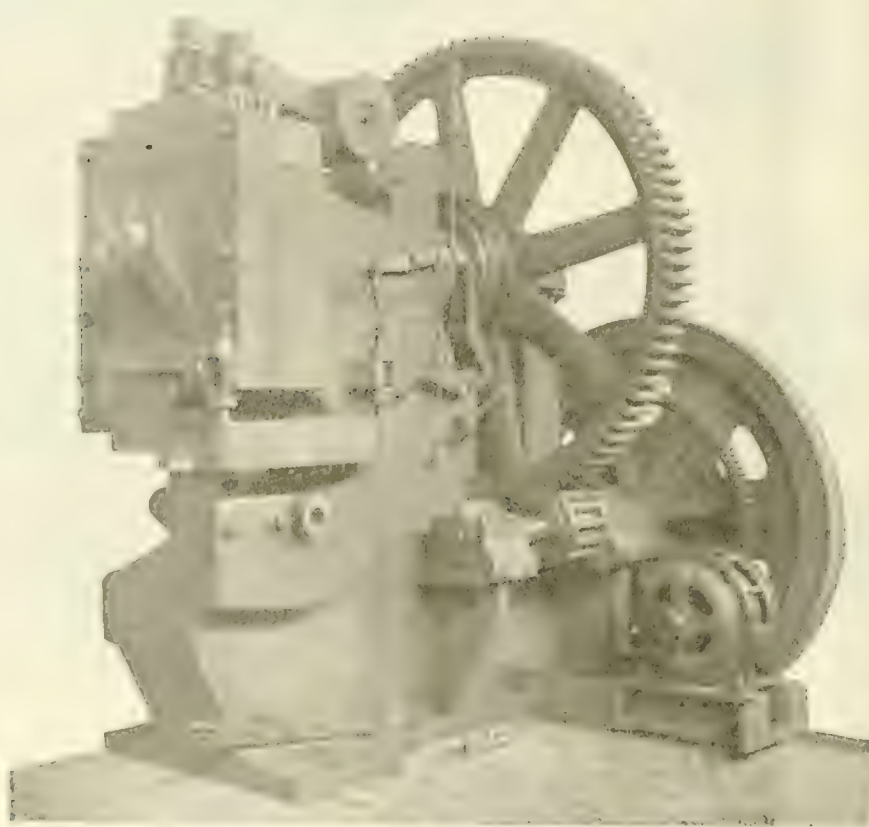
FOSTER MACHINE CO., ELKHART, IND.

If you cannot find this page, send place with letters to be answered.

"The Quality Line"

PUNCHING and SHEARING MACHINERY

Machinery
Equipment
for
Rolling Mills
Bridge and
Structural
Works



Machinery
Equipment
for
Steel Car
Plants
and
Shipyards

No. E. OPEN THROAT BAR IRON SHEAR
Capacity 11 x 24₁ Flat, 1' Round, 3₁/₂ Square

All machines are built of same high-grade workmanship and material that have given the "L&A" product a recognized standard of quality for over 50 years.

May we send you our big catalogue.

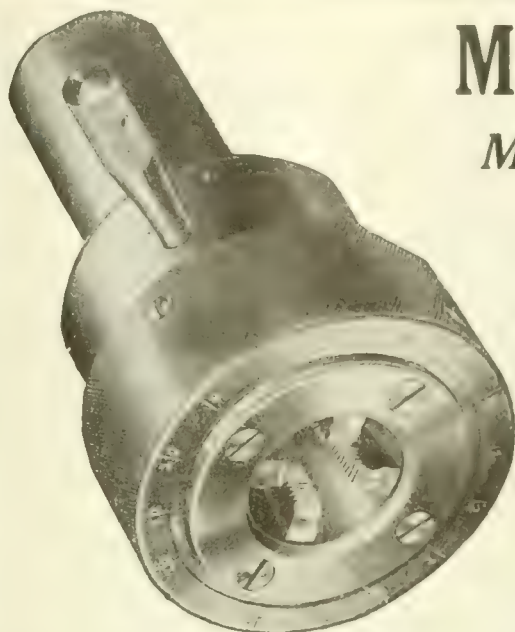
The Long & Allstatter Co.

*Established
1856*

American Punch & Shear Works
HAMILTON, OHIO, U.S.A.

Canadian Agents:
RUDOLPH-BELNAP MACHINERY CO., LIMITED
Toronto Montreal

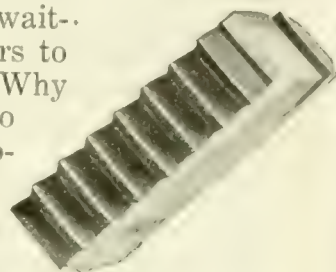
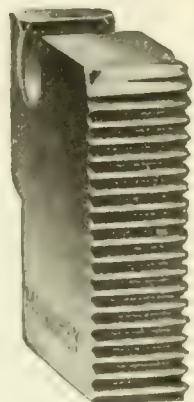
*Incorporated
1878*



Murchey Chasers

Mean Quick Deliveries

Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?



Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

Murchey Machine & Tool Company, Detroit, Mich.

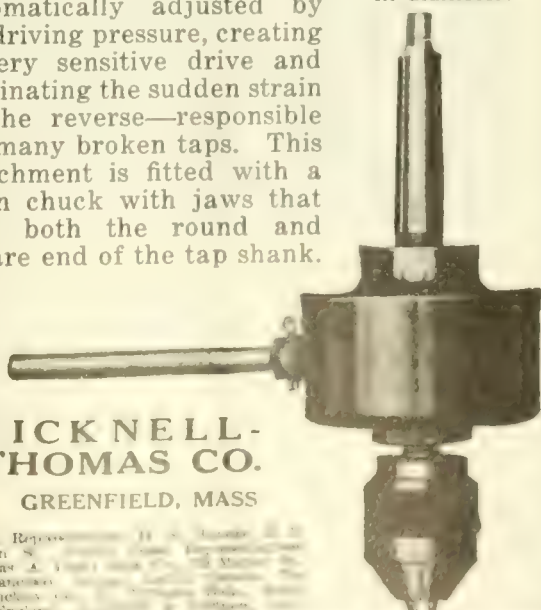
THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne, FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France

THE BICKNELL-THOMAS TAPPING ATTACHMENT

Fits Any Make Drill

A friction mechanism inside the body of the attachment is automatically adjusted by the driving pressure, creating a very sensitive drive and eliminating the sudden strain of the reverse—responsible for many broken taps. This attachment is fitted with a plain chuck with jaws that grip both the round and square end of the tap shank.

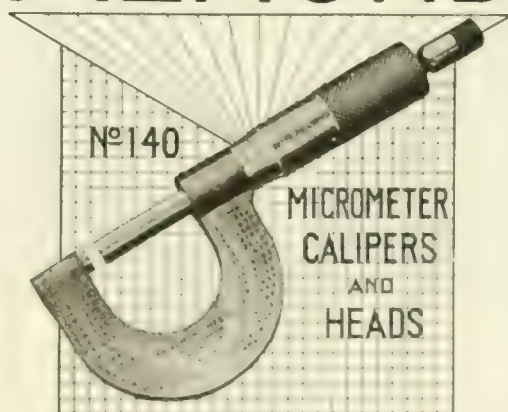
Made to take taps from 3-32" to 1-4" in diameter.



BICKNELL-THOMAS CO.
GREENFIELD, MASS

Chicago, Reposs. H. S. Loomis, 111 N. La Salle St.
Jefferson, S. C. J. H. Loomis, 111 N. La Salle St.
The Ohio A. L. Loomis, 111 N. La Salle St.
San Francisco, J. H. Loomis, 111 N. La Salle St.
Jas. Buckley, 111 N. La Salle St.
real. Englewood, 111 N. La Salle St.
London, W. C. J. H. Loomis, 111 N. La Salle St.

ALMOND



Nº140

MICROMETER
CALIPERS
AND
HEADS

All Almond Micrometers are inspected and adjusted to Johanson Gages and recognized comparison only with these gages.

Almond Service. Should the Micrometer need readjusting at any time or defect in material or workmanship develop send to Ashburnham and readjustment or replacement will be made without expense.

OTHER ALMOND PRODUCTS

DRILL CHUCKS, RIGHT ANGLE TRANSMISSION LATHE CHUCKS, FLEXIBLE STEEL TUBING

T. R. Almond Mfg. Co., Ashburnham, Mass.

Can you Forget?

AS long as you live you'll remember November 11th, 1918—Armistice Day.

That was the day the enemy surrendered.

That was the day of Victory for our army.

Day after day—year after year—through rain, cold, heat, mud, death—they had fought bravely, stubbornly, cleverly, faithfully—the spearhead of fate pointing inexorably at the black heart of the enemy.

REMEMBER the Somme? Ypres? Vimy? Passchendale? Cambrai? MONS?

Can't you catch this brave spirit?

Can't you see how small is our task compared with theirs?

Shall we fail to lend our money to the country for which they gave their lives?

The Victory Loan 1919 must be a victory, too. It is needed to pay our obligations to the army and to keep the fair name of Canada writ high among the nations.

This is a War Loan!

Canada needs to borrow your money! If the Victory Loan succeeds it will be another Mons for Canada!

Let us show the world again that what Canada undertakes Canada accomplishes

Buy Victory Bonds

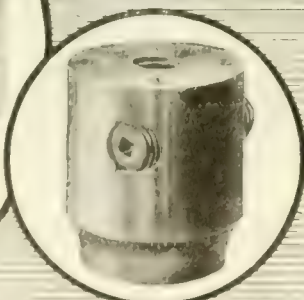
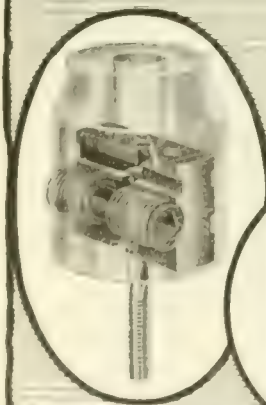
EVERY DOLLAR SPENT IN CANADA

This space donated to the Victory Loan 1919 Campaign by

The William Kennedy & Sons, Limited, Owen Sound

ESTABLISHED 1860

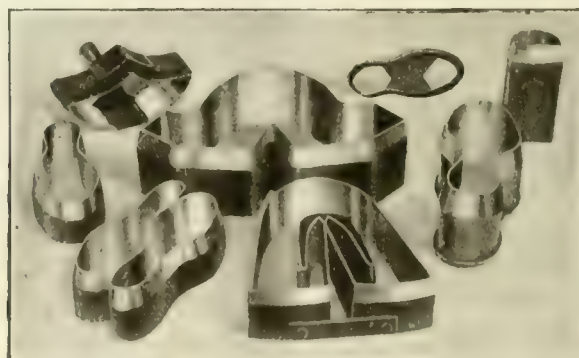
SKINNER DRILL CHUCKS



Built For Production Not For Price

THE SKINNER CHUCK COMPANY
New Britain, Conn.

Quality Cutting Dies For All Purposes



Our experience is varied in this line of work and we are completely equipped to handle any kind of CUTTING DIE WORK.

The picture shows you a few of the many kinds and styles, such as Envelopes, Labels, Lithographs and Advertising Novelties, Boxes, Wrappers, Gaskets, Paper Napkins, Drinking Cups, etc., Cutting Dies which we manufacture.

Send for our literature.

The Hoggson & Pettis Mfg. Co.
New Haven, Conn., U. S. A.

Sold by Geo. F. Foss Machinery & Supply Company, Limited,
305 St. James St., Montreal.

Satisfactory

OUR 16-INCH PLAIN MOTOR DRIVE LATHES HAVE PROVEN A GREAT SUCCESS

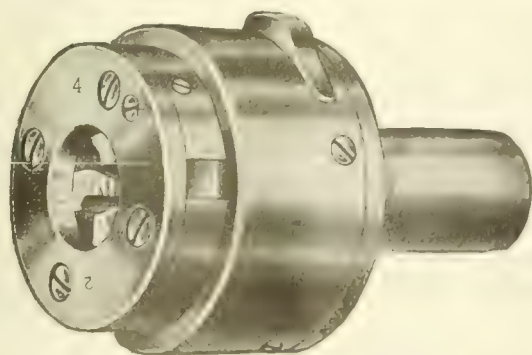
They are very simple in operation, have no overhang. They have almost the power of a geared head. They are compact and rigid, powerful and efficient. They are accurate and economical and very satisfactory.

We want you Canadians to install
The Lathe with the Pull
The Lathe of Satisfied Accuracy

Make them pay for themselves, as they will. We build 14-inch belt drive, 16-inch belt and motor drive, 18-inch belt and motor drive, geared head or plain, 20 and 24-inch belt and motor drive, geared head or plain.

THE CISCO MACHINE TOOL CO.

CINCINNATI, U.S.A.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Collets and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1 1/4" and 1 1/2".

All parts are hardened and ground and interchangeable. It is a standard H & G.

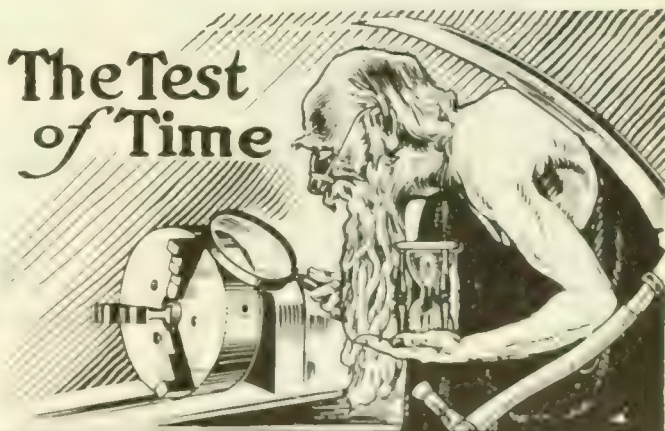
Ask for Catalog

Eastern Machine & Screw Corp.



[New] Haven, Conn., U.S.A.

The Test of Time



"CUSHMAN"
CHUCKS
1862

LATHE CHUCKS DRILL CHUCKS
FACE PLATE JAWS

Three Generations of Skilled Mechanics
have made them and have used them

THE CUSHMAN CHUCK CO.
HARTFORD, CONN., U.S.A.

Why use makeshifts?

WHY waste time and energy with makeshift devices for boring operations when Williams' "Agrippa" Adjustable Boring-Tool Posts offer convenience and efficiency developed to the nth power?

Each post accommodates a wide range of Bars, the height of which is readily adjusted; a turn of the Knurled Ring raises or lowers the base on which they rest. The whole device is instantly and rigidly locked by tightening the Set Screw.

Four sizes for $\frac{1}{2}$ to $2\frac{1}{4}$ " diameter Bars—furnished with or without Bars.

Ask for Machinists' Tools Booklet.

J. H. WILLIAMS & CO.,

"The Drop-Forging People"

45 Richards St., Brooklyn, N.Y.

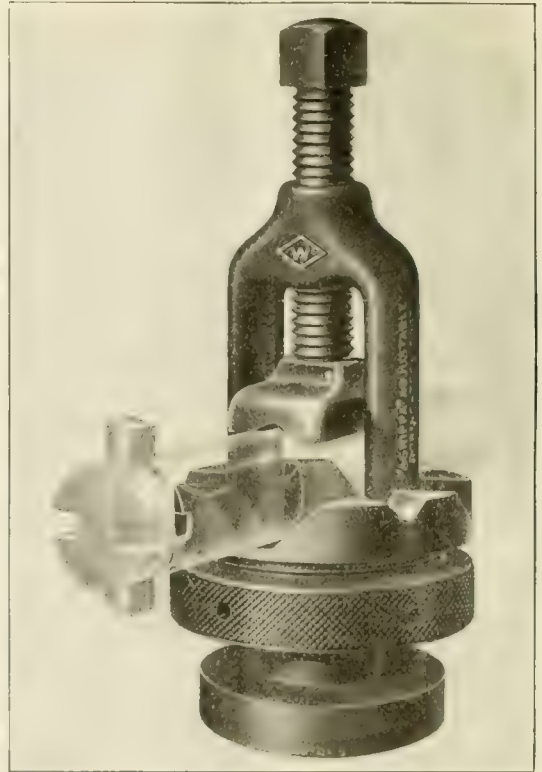
The A. G. Low Co., Ltd.,

45 Pacific Ave., Saskatoon, Sask.

Agents for Manitoba, Alberta, Saskatchewan and British Columbia.

Williams' "Agrippa"

Adjustable Boring - Tool Posts



FRANKLIN DIE-CASTINGS

Fast and Accurate Duplication at Low Cost

Eliminating the excessive cost of machined parts has been our work for twenty-seven years.

Thus the scope of Franklin Die-Castings has widened, their utility in many industries has been demonstrated, and a great and growing industrial economy accomplished.

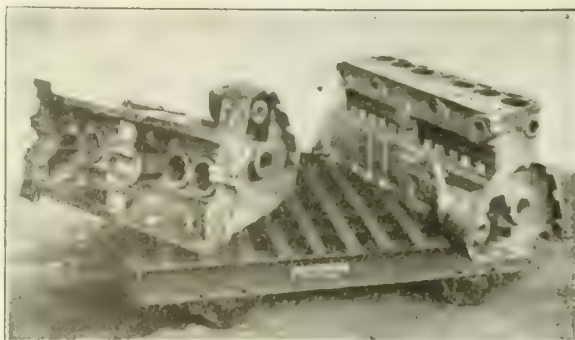
We cast in aluminum, zinc, tin and lead base alloys. Bearings and hard metal parts. Quantity deliveries assured.

Write for our Booklet "C." Send sample of part, or blue print, and we will promptly make estimate and recommendation.

FRANKLIN MANUFACTURING COMPANY

746 GIFFORD STREET, SYRACUSE, NEW YORK, U.S.A.

How long would it take to clean this Cylinder by your present methods—and what would be the labor cost alone?



How long would it take to pay for a Sand-Blast Installation from the saving in labor cost if you cleaned it in 3 minutes?

CLEANED IN THREE MINUTES BY

PANGBORN SAND BLASTS

and whether your requirements are the cleaning of Castings, Forgings, Stampings, Sheet, Plate or Structural, or the removal of scale from Heat Treated Parts there's a Pangborn Unit or Combination for every need, large or small, that will make a saving for you—and a more attractive product.



Milwaukee Shapers

*Are needed in Up-to-date
Canadian Shops*

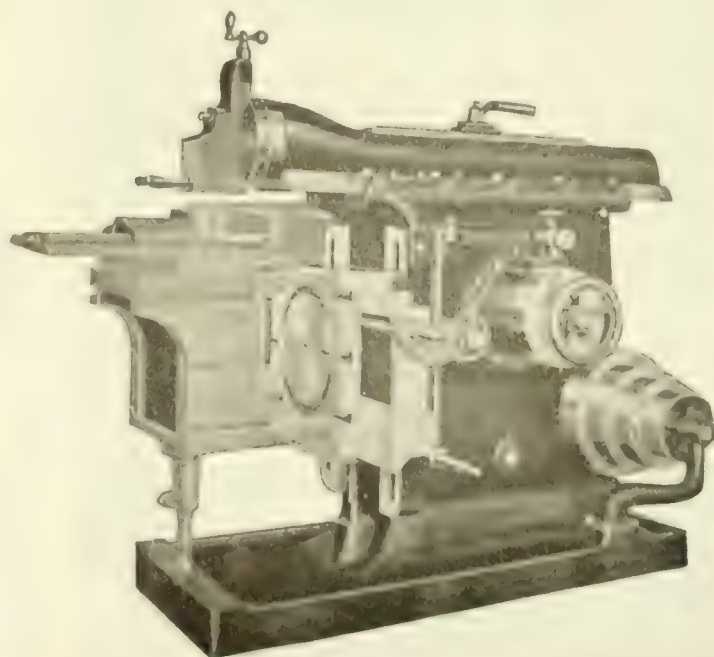
Milwaukee Back Geared Crank Shapers are built in 16-inch, 20-inch and 24-inch sizes.

**MILWAUKEE
SHAPER CO.**

1029 Coldspring Ave.

Milwaukee, Wisconsin

Milwaukee simplicity, power and accuracy play an important part in turning overhead expense into profitable production.





Your Money's Worth

Never again will the Canadian Nation and People be the same careless improvident spenders of "ante bellum" days. "EFFICIENCY" and "GET YOUR MONEY'S WORTH" will be the popular motto and the successful machine shop manager must be able to see the advantage of making one pound of High Speed Tool Steel do the same work as ten pounds in forged tools; in other words he must and will

USE ARMSTRONG TOOL HOLDERS

No heavy "stub-ends" to throw away. No time lost with men at the grinder while lathes stand idle. No stock of heavy sizes of steel to carry, and the blacksmith as a tool-dresser is eliminated entirely.

Armstrong Tools are great favorites with the men—a good thing to consider from a production standpoint.

Our Catalogue is of handy pocket size and will be mailed to you upon request



Files That Stay Sharp

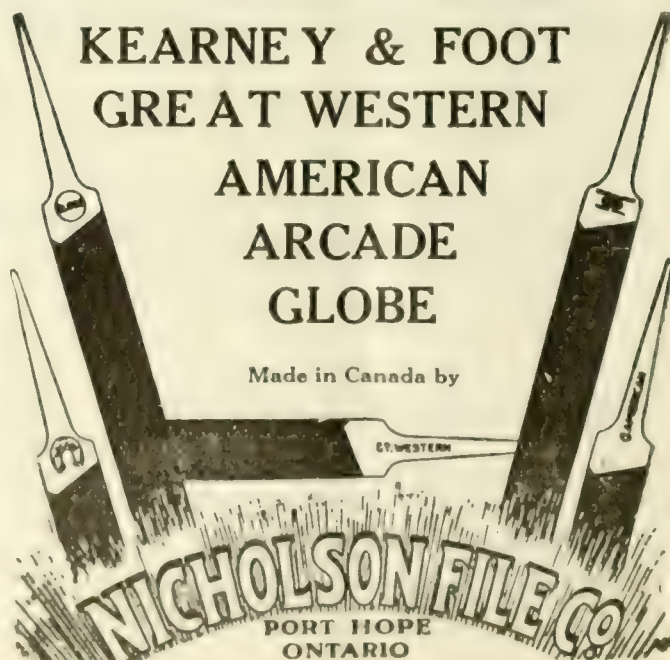
Workmen know it is better to throw away a file as soon as it becomes worn. They can't get good results from dull files.

Do not be afraid to tell your workman to discard a Famous Five File as soon as it becomes dull. You will have obtained the maximum service before its usefulness is gone.

Famous Five Files are hardened by a special process which increases their durability.

Specify them when ordering.

They are:





*The Largest Selling
Quality Pencil in
the World*

VENUS PENCILS

*17 Black Degrees
6B softest to 9H hardest
and
hard and medium Copying
All perfect*

Engineers work to scales too fine for lay minds to comprehend; the breadth of each pencil line in a blue print has a significance. They use VENUS Pencils because they can depend absolutely upon the uniformity of each degree.

For bold heavy lines
6B-5B-4B-3B

For general writing
and sketching
2B-B-HB-F-H

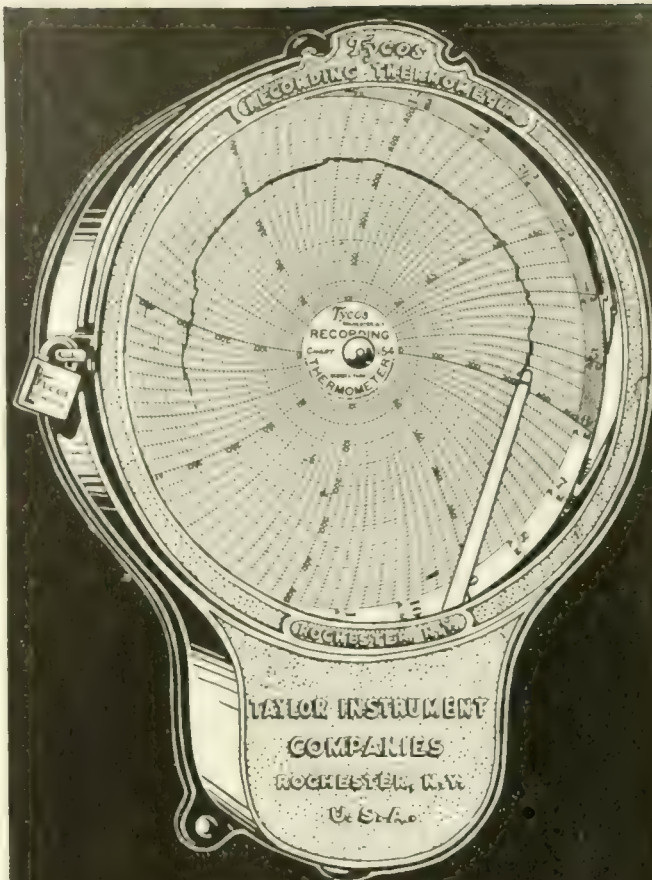
For clean fine lines
2H-3H-4H-5H-6H

For delicate thin lines,
maps
7H-8H-9H.

AmericanLeadPencilCo.
238 Fifth Avenue, New York
and Clapton, London, Eng.

FREE

We shall be glad to send you free samples if you will write on your letter-head, specifying three degrees you wish to try.



There's a
Tycos
or
Taylor
temperature
instrument
for every
purpose

Taylor Instrument Companies

HINTS TO BUYERS

DARLING BROTHERS, LIMITED

Engineers, Manufacturers and Founders
120 Prince Street, MONTREAL, P.Q.

*Pumps for any Service—Steam Appliances—
Freight Elevators—Webster Vacuum
Heating System.*

Bryant Chucking Grinder Company

Springfield, Vermont

Builders of

**Hole, Hole and Face and Deep
Hole Grinders**

PRESSES and SHEARS

Sheet Metal Working Machinery
THE D. H. STOLL CO., INC.
26 Lansing St., BUFFALO, N.Y.



**MAXIMUM
EFFICIENCY
IN
BELTLACING**

A broken belt won't hold up production long if you repair it with

Patent Steel BRISTOL'S Belt Lacing

Pronounced the most efficient, because it is the easiest, the quickest and the best to apply.

No special tool is required. Simply a hammer and a soft block of wood to drive the sharp, staggered steel prongs through the belt in double rows and to clinch the points. The belt is gripped firmly without danger of cutting or weakening.

Send for samples and Catalog I-707.

THE BRISTOL CO., Waterbury, Conn.

Beaudry Hammers

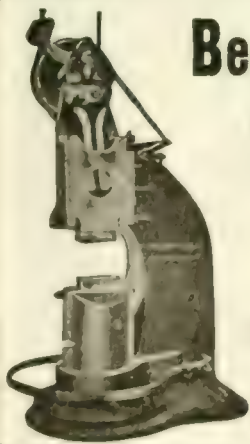
FOR GENERAL FORGING

Save Fuel, Time and
Labor. Cut Forging
Costs in two.

BELT OR MOTOR DRIVEN

BEAUDRY & COMPANY, Inc.

141 Milk Street, Boston, Mass.
Alfred Herbert, Ltd., Coventry, Eng-
land, London, Paris, Calcutta, Yokohama.



STEEL CASTINGS

ELECTRIC Steel Castings of
all kinds from 5 pounds to
5,000 pounds.

PROMPT DELIVERY

Manitoba Steel Foundries, Ltd.

1204 McArthur Building
Winnipeg

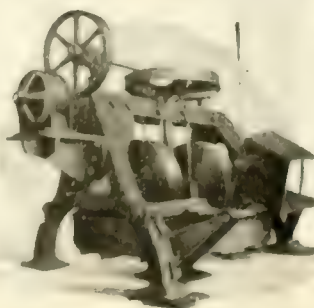
Manitoba

IT IS IMPORTANT

when advertising that as many prospective buyers as possible read what you are selling. We advise you to use **Canadian Machinery.**

**Canadian Steel Foundries Need
Frost Improved Sand Mills**

WINNING FEATURES



Heavy Muller's
Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
112 W. Adams St., Chicago

IMPORTERS OF INDUSTRIAL DIAMONDS <small>Goods Submitted on Memorandum if Desired</small> JOHN W. GORDON, Manager 5 James Street, ST. CATHARINES, ONTARIO	WHEEL TRUEING TOOL CO. DETROIT 	MANUFACTURERS OF DIAMOND POINTED TOOLS <small>All Mountings Fully Guaranteed</small> Office and Factory: 88 West Pitt Street, WINDSOR, ONTARIO
---	---	--


CLUTCHES

**Combined Jaw and Friction. Friction only.
Gas Engine Clutches. Jaw Clutches.**

Write for interesting printed matter.

The Positive Clutch & Pulley Works, Ltd., Canada
MONTREAL Factory: Aurora, Ont. **TORONTO**

FOR EVERY INDUSTRIAL REQUIREMENT



ONE PAIR
OR 20,000
PER DAY


WRITE FOR CATALOG

T. A. Willson & Co., Inc. Canadian Office: 23 Scott St., Toronto

"Cincinnati Electrics"

Cut Your Costs

Hand or Electric Drills, 12 sizes, 1/16 to 2 1/2 in. capacity. Ball bearing through. Larger sizes fitted with screw feed.



We make complete line of Portable Electric Drills and Grinders for all purposes. Especially built to withstand hard usage. For all currents and voltages. Catalog?

Cincinnati Electric Tool Co., Cincinnati, Ohio

STEEL CASTINGS

DELIVERY

QUALITY

JOLIETTE STEEL CO.

LIMITED

Sales Office:
MONTREAL, Que.

Works:
JOLIETTE, Que.

WILKINSON & KOMPASS

TORONTO HAMILTON WINNIPEG

IRON AND STEEL

HEAVY HARDWARE

Mill Supplies Automobile Accessories

WE SHIP PROMPTLY

SMELTERS & WELDERS GOGGLES

We have a style to meet every requirement




Write for Catalogue
Consolidated Optical Company
 Montreal Toronto Winnipeg Vancouver

STEAM TURBINE DRIVEN TURBO BLOWER SET

with Condensing Plant for quick delivery from stock at very favorable price.

Further particulars from
ESCHER, WYSS & CO.
 112 College Bldg. MONTREAL

SEND US YOUR INQUIRIES AND PRINTS FOR QUOTATIONS
 ON **SPRING SHACKLE BOLTS** OR
 PRESSED STEEL AND BRASS GREASE CUPS, OILERS, OIL CUPS



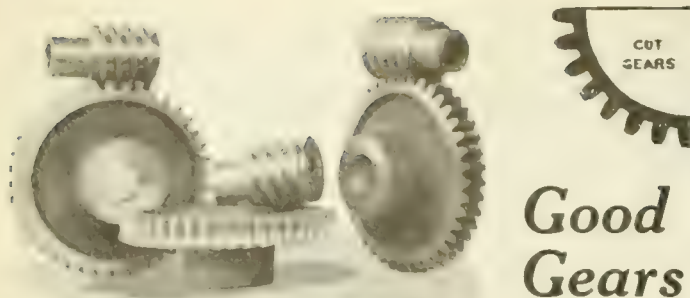



Samples and Catalogues Sent on Request

Canadian Winkley Co. Limited
 Windsor, Ont.

"PLAIN"

"SECTIONAL"



**Good
Gears**

Hamilton Gear CO. LTD Toronto

Forrest, Jackson & Forrest

Engineers, Contractors and Manufacturers' Agents

Portable Cranes, Turntables, Trans-
veyors, Plastic Metallic Packing

HEAD OFFICE : 222 Craig St. W., Montreal, Can.

FITCHBURG

**Plain Cylindrical
Grinders**

Built by

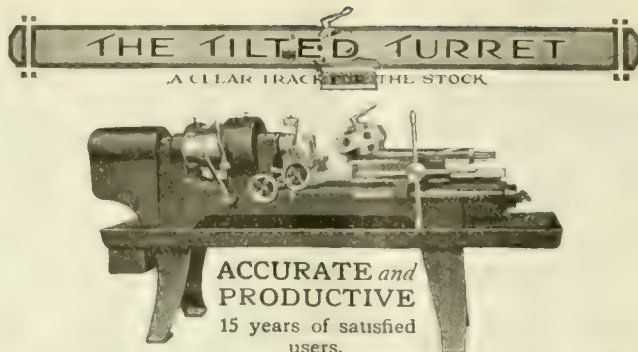
Fitchburg Grinding Machine Co.
FITCHBURG, MASS., U.S.A.

**BATH Universal
Manufacturing Grinders**

built by

**Universal Grinding Machine
Company**

Fitchburg, Mass. U. S. A.



Ask the User

Send for Catalog

WOOD TURRET MACHINE CO

BRAZIL, INDIANA U.S.A.

IRON and STEEL PRODUCTS

New and Second-hand Machinery

Builders' and Contractors' Machinery

Engineering and Mill Supplies, Tools, etc.

Let us list your second-hand machinery or quote you on same.
We are also open for proposition to carry some good lines.

JAMES WHEATTEN

505 Eastern Township Bldg.,

MONTREAL, P.Q.

PRESSES ALL — TYPES



Press Attachments, Automatic.
Metal and Wire Forming Machines.
Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

Baird Machine Co., Bridgeport, Conn., U. S. A.



NORTON JACKS

FOR ALL KINDS OF HEAVY LIFTING

Send for complete catalogue showing
50 styles 10 to 100 tons capacity.

Made
only by **A. O. NORTON, Limited**
Coaticook, Prov. Quebec, Canada



**GEARS AND GEAR CUTTING
SPROCKETS AND CHAINS**

In stock and to order, any size from one-
quarter inch to six-foot in diameter, any
material. Estimates and gear advice cheer-
fully furnished.

Grant Gear Works, Inc., 151 Pearl St.
G. B. GRANT Boston, Mass.
U.S.A.

Toronto Testing Laboratory

METALLURGISTS CHEMISTS FUEL ENGINEERS
160 Bay St., Toronto.

Tests of Metals, Fuels, Oils, Water, Etc.

INDUSTRIAL RESEARCH



WE MANUFACTURE RIVETS of every
description, $\frac{5}{8}$ inch. dia. and smaller

PARMENTER & BULLOCH CO., LTD.
CANANOQUE, ONT.



METALWOOD MANUFACTURING CO. DETROIT

Hydraulic and Hydro-Pneumatic Machinery

Exclusive Sales Representatives:

Canadian Fairbanks-Morse Co., Ltd., Montreal and Toronto;
R. E. Ellis Engineering Co., 621 Washington Blvd., Chicago;
Fairbanks-Morse & Co., Inc., 30 Church St., New York City;
Sherritt & Stoer Co., Inc., Finance Bldg., Philadelphia, Pa.

DIAMOND TOOLS FOR TRUEING GRINDING WHEELS



The GENERAL SUPPLY COMPANY of CANADA, Limited

OTTAWA TORONTO MONTREAL WINNIPEG VANCOUVER
356 Spark St. 38 Toronto St. 408 McGill Bldg. 85 Water St. 906 Vancouver Block

Sole Canadian Agents for

THE JOYCE-KOEBEL COMPANY, INC.

NEW YORK Formerly Geo. A. Joyce Co., Ltd. LONDON



Davis-Bournonville Oxy-Acetylene Welding and Cutting Apparatus

"Made in Canada"

AT NIAGARA FALLS, ONT.

DAVIS-BOURNONVILLE COMPANY

Sales Offices: 168 King St. W., Toronto; 44
Craig St. W., Montreal. Factories in Jersey
City, Elkhart, Ind.; Niagara Falls, Ont. Sales
Offices in all principal United States cities.

BUY VICTORY BONDS

J.C. McLAREN BELTING



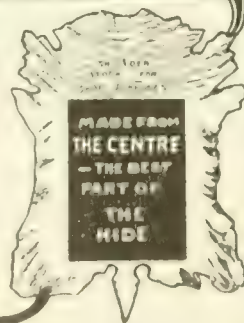
Will Save You Money
In Every Day of Service

Modern plant and thorough knowledge of requirements of belting guarantees perfect satisfaction to all buyers. Our belts are the result of using best leather, and our 57 years' experience.

Ask for Quotations.

J. C. McLAREN BELTING CO.

Limited
Montreal Toronto Winnipeg



For Hardness Testing

In shop and laboratory use the

Standard Scleroscope

Universally adopted direct reading, non-destructive, and the only instrument that gives with accuracy the hardness of all parts of the world, thus solving problems of ordering material to specification.

BOOKLET FREE

Heat Indication

THE PYROSCOPE

By optical means is fast, accurate, the correct way. The PYROSCOPE has solved the problem.

Proven accurate, inexpensive, for electric arc used. Built to stand rough usage and open continuous use. Used by the Government and best firms.

Shore Instrument & Mfg. Co. 555-7 W. 22nd St. New York
Agents for Canada: A. R. Williams Machy Co., Ltd., Toronto, Can.

Riddel & Co., 40 St. Enoch Square

Estab GLASGOW, SCOTLAND 1876

Specialists in

HEAVY MACHINE TOOLS

for

Shipyards, Boilermakers, Engineers and
Structural Iron Works

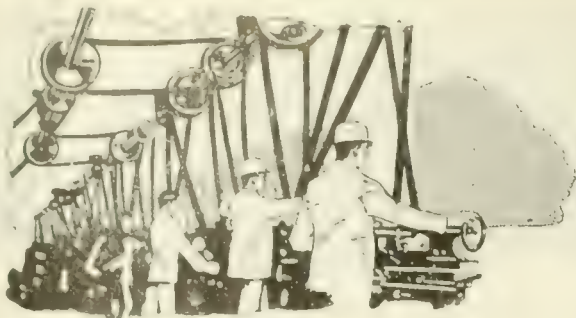
New and Second Hand

'Lists on Application. Enquiries and Correspondence
Solicited.

If that old machine is not
earning you money, then
it's losing money, see!

Sell it to the firm
who can use it, and
both of you will
make money.

ADVERTISE IT IN THE CLASSIFIED
SECTION OF
CANADIAN MACHINERY



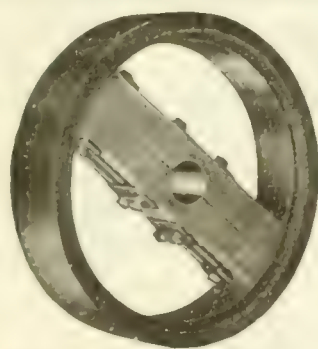
PREVENT big transmission and fuel losses which result from belt slip and air fanning by installing

AMERICAN STEEL SPLIT PULLEYS

They combine maximum strength with light weight and are guaranteed to reduce belt slip and air resistance to a minimum.

A valuable 37 page book on pulleys sent free on request.

The American Pulley Company
Philadelphia, Pa.



**General
Efficiency
Demands
the Use of**

BERNARD Wood Split Pulleys

The time has come for us as a continuation of the progress of the world to be concerned. But in the industrial pulley the time has come to be waged from battles for industrial supremacy wherein the advantage will lie with the plant equipped with the most economical

Competition will be more intense, and in this con-

BERNARD Wood Split Pulleys will help you elimin-

The A. Bernard Industrial Co.

Manufacturers of High Grade
Power Transmission Apparatus.

Office and Works: Fortierville, Que., Can.

STEEL CASTINGS

1 to 5,000 pounds

Highest Quality

PROMPT AND RELIABLE SERVICE

**SWEDISH CRUCIBLE STEEL CO.
OF CANADA, Ltd., Windsor, Ont.**

Mention
CANADIAN MACHINERY
When Writing to Advertisers

"Nichrome" Castings

"Made to Endure High Temperature"

CANADIAN DRIVER-HARRIS Co., Ltd.

WETZEL, 1011 AN. 1011
CHICAGO
20-22-23-24-25-26-27

WALKERVILLE, ONT.

CANADA
AMERICAN OFFICE AND WORKS
HARRISON, N. J.

BRITISH WORKS
MANCHESTER
ENGLAND

Philadelphia GEAR Works

VINE STREET PHILADELPHIA, PA.

Spur, Bevel, Spiral, Herringbone and Intermittent

GEARS and PINIONS

Made in all kinds of metals, rawhide and fibre

**SOCKET WHEELS
MADE TO ORDER**

**DISTRIBUTORS OF
DIAMOND CHAINS**

For Power Transmission, Machinery and Motor Trucks, Motor-Cycles and Bicycles.

We ship gears to all parts of Canada. Write us when you want good gears, good service, good prices.

Get our Catalogue: "All About Gears."



Canadian Machinery Buyers Directory

If what you want is not here, write us, and we will tell you where to get it. Let us suggest that you consult also the advertisers' index facing the inside back cover, after having secured advertisers' names from this directory. The information you desire may be found in the advertising pages. This department is maintained for the benefit and convenience of our readers. The insertion of our advertisers' names under proper headings is gladly undertaken, but does not become part of an advertising contract.

ABRASIVE MATERIALS

Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford
Canadian Fairbanks-Morse Co., Montreal
Geo. F. Foss Mch. & Sply. Co., Montreal
Ford-Smith Mach. Co., Hamilton, Ont.
Norton Co., Worcester, Mass.
Plews, Ltd., Winnipeg, Man.
Pittsburgh Crushed Steel Co., Pittsburgh.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal.

ACETYLENE

Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Union Carbide Co., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS

Prest-O-Lite Co., Inc., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS

Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Canada, Galt, Ont.

ACCUMULATORS, HYDRAULIC

Canadian Fairbanks-Morse Co., Montreal
Garlock-Walker Mach. Co., Toronto
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York
Williams & Wilson, Ltd., Montreal.

AIR COMPRESSORS

See Compressors

AIR CONDITIONS, DEHUMIDIFYING—HUMIDIFYING

B. F. Sturtevant Co., Galt, Ont.

AIR CYLINDERS

Smalley-General Co., Bay City, Mich.

AIR RECEIVERS

Can. Ingersoll-Rand Co., Sherbrooke, P.Q.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal
Williams & Wilson, Ltd., Montreal.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS

Can. Blower & Range Co., Kitchener

ALUMINUM

Canada Metal Co., Toronto
Tallman Brass & Metal Co., Hamilton.
Williams & Wilson, Ltd., Montreal.

ALLOY, STEEL

Armstrong, Whitworth of Can., Montreal.
Blancie Co., L. C., New York City.
Baker & Co., Inc., H. Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawbridge Bros. Co., Boston, Mass.
Kaiser Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.
Swedish Steel & Importing, Montreal.
Vanadium Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Allegheny, Pa.

ANCHORS

Fellows Bros., Ltd., Chadley Heath, Eng.

ARBORS

Brown & Sharpe Mfg. Co., Providence, R.I.
Canadian Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland
Ford-Smith Mach. Co., Hamilton, Ont.
Wilson & Co., J. C., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney, Hartford, Conn.
Whitman & Barnes Mfg. Co., Boston, Mass.
Williams & Wilson, Ltd., Montreal.

ARCHITECTURAL IRON

Page Steel & W. Co., Chicago, Ill.

ARRESTERS, DUST

Northern Crane Wks., Toronto, Ont.
Panthern Corporation, Toronto, Ont.

AUTOGENOUS WELDING AND CUTTING PLASMA

Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Toronto, Ont.
St. Lawrence Welding Co., Montreal
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY

Baird Machine Co., Toronto, Ont.
Garlock-Walker Mach. Co., Toronto
Garlin & Son, Montreal, Que.
National Acme Co., Montreal, Que.
Pratt & Whitney, Hartford, Conn.
Riedelmann Mach. Co., Toronto, Ont.
Williams Machine Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal.

AUTOMATIC METAL CUTTING-OFF MACHINES

Greenfield Tap & Die Corp., Greenfield, Mass.
Wells Bros. of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal
Canada Metal Co., Toronto
G. F. Foss Mch. & Sply. Co., Montreal.

AUTO SHEET METAL MACHINERY

Quisenberry Co., St. Marys, Ohio.

AUXILIARY HEADS

Hoover Mfg. Co., Desport, Ill.

BABBITT METAL

Canada Metal Co., Ltd., Toronto, Ont.
Hart Metal Co., Ltd., Toronto
Magnolia Metal Co., Montreal
Rice Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Whitman & Barnes Hamilton, Ont.
Williams & Wilson, Limited, Montreal.

BAND SAWS

Oliver Mach. Co., Grand Rapids, Mich.

BALL BEARINGS

Canadian Fairbanks-Morse Co., Montreal
Can. S. K. F. Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto
Morse Sewer & Nut Co., John Ingersoll
Rochester Ball Bearing Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

BALLS, STEEL

Atkins & Co., Ltd., Wm. Sheffield, Eng.
Baker Co., L. C., New York City
Chapman Double Ball Bearing Co., Toronto
Parker & Co., Inc., Montreal, Que.
Case Ball Bearings Co., Ltd., Toronto
Rochester Ball Bearing Co., Rochester, N.Y.
Morse Sewer & Nut Co., Toronto
Williams & Wilson, Limited, Montreal.

BALLS, RUBBER

Gray Ball Bearing Co., Ltd., Toronto

BAROMETERS

Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST

Payson Bros., Hazelton, Md.

BARRELS, STEEL SHOP

Payson Bros., Hazelton, Md.
Cleveland Wagon Spring Co., Cleveland

BARRELS, TUMBLING

Payson Bros., Hazelton, Md.
Kaiser Ellison & Co., Ltd., Montreal
Norton, Ralph B., Agent, Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

BASE FACING MACHINES

Victoria Foundry Co., Ottawa, Ont.

BARS, BORING

Canada Metal Co., Toronto
Morse Sewer & Nut Co., John Ingersoll
Norton, Ralph B., Agent, Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

BARS, MERCHANT

Canada Metal Co., Toronto

BARS, CONCRETE REINFORCING

Canada Metal Co., Toronto

BEADING MACHINES

Canada Metal Co., Toronto

BELT CONVEYORS

Canada Metal Co., Toronto

BEARINGS, ROLLER

Canada Metal Co., Toronto

BEARINGS, DIE CAST

Canada Metal Co., Toronto

BELT-LACING MACHINES, HOOKS AND EYES

Canada Metal Co., Toronto

BELT LAYING LEATHER

Canada Metal Co., Toronto

BELTING, RAYATA

Canada Metal Co., Toronto

BELT HOOKS, WIRE

Chapman Rubber Co., Grand Rapids

BELTING, RUBBER

Can. Consolidated Rubber Co., Montreal

BELTING, CHAIN

Can. Fairbanks-Morse Co., Montreal
Can. Link Belt Co., Toronto, Ont.
Jones & Glasco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg. Co., Hartford, Conn.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, CONVEYOR

Can. Consolidated Rubber Co., Montreal
Baxter & Co., Ltd., J. R., Montreal.
Canadian Fairbanks-Morse Co., Montreal
Federal Engineering Co., Ltd., Toronto
Graton & Knight Mfg., Worcester, Mass.
Jones & Glasco, Montreal, Que.
McLaren Belting Co., J. C., Montreal.
Morse Chain Co., Ithaca, N.Y.
Plews, Ltd., Winnipeg, Man.
Rice Lewis & Son, Toronto, Ont.
Standard Mach. & Supplies, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, FRICTION AND SURFACE

Can. Con. Rubber Co., Ltd., Montreal.

BELTING, LEATHER

Can. Graton & Knight Mfg. Co., Montreal
John Tullis & Son, Glasgow, Scotland.

BELTING, WOVEN

Federal Engineering Co., Ltd., Toronto

BENDING ROLLS, PLUTE & AUGH

Wickes Bros., Saginaw, Mich.

BENDING MACHINERY

Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co., John Dundas
Brown-Rogers Co., Ltd., Hamilton, Ont.
Cape Blower & Forge Co., Kitchener
Garlock-Walker Mach. Co., Toronto
Williams & Wilson, Ltd., Montreal.

BLAST GATES

W. S. R. Co., New York, N.Y.

BLASTING MACHINES, SAND

Garlock-Walker Machinery Co., Toronto
Jardine & A. R., Co., Hamilton, Ont.
National Mach. Co., Toronto, Ont.
Niles-Bement-Pond Co., New York
Tobolsky Machine & Tool Co., Toledo
Williams & Wilson, Limited, Montreal.

BILLET MARKERS

Matthews & Co., Jas. H., Pittsburgh, Pa.

BILLETS

Atkins & Co., Ltd., Wm. Sheffield, Eng.
Swedish Steel & Importing Co., Ltd., Montreal.

Aluminum Steel Corp., St. Louis, Mo.
Kaiser Ellison & Co., Ltd., Montreal
Morse Sewer & Nut Co., John Ingersoll
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING

Canada Metal Co., Toronto
Morse Sewer & Nut Co., John Ingersoll
Norton, Ralph B., Agent, Montreal.

BINS, STEEL

Dunn & Wm. & Son, Wm. Sheffield, Eng.
Morse Sewer & Nut Co., John Ingersoll
Norton, Ralph B., Agent, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

BLACKSMITH WORK

Canada Metal Co., Toronto

BLASTING MACHINES, SHOT AND STEEL GRIT

Canada Metal Co., Toronto

BROOMS AND STAIRS

Canada Metal Co., Toronto

BLOWERS

Canada Metal Co., Toronto
Morse Sewer & Nut Co., John Ingersoll
Norton, Ralph B., Agent, Montreal.

BLOW PIPES AND REGULATORS

Canada Metal Co., Toronto

BLUE PRINTING MACHINERY

Canada Metal Co., Toronto

BOARDS, GLASS CUTTING

Lufkin Rule Co., of Can., Windsor, Ont.

BOARTZ

Jonas, Koebel & Co., Inc., New York.

BOLT CUTTERS

Greenfield Tap & Die Corp., Greenfield, Mass.

BOLT CUTTERS

Fellows Gear Shaper Co., Springfield, Vt.
Greenfield Tap & Die Corp., Greenfield, Mass.

Wells Bros. of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BOOKS, TECHNICAL

MacLean Publishing Co., Toronto.

BOILERS

Isomson Bridge Co., Montreal, Que.
MacGovera & Co., Montreal, Que.

BOILER BREECHINGS

William Hamilton Co., Peterboro, Ont.

BOLT CUTTERS AND NUT TAPERS

Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto
Landis Machine Co., Waynesboro, Pa.
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal.

BOLTS

Aikenhead Hardware Co., Toronto, Ont.
London Bolt & Range Wks., London, Ont.
Morse Sewer & Nut Co., John Ingersoll.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton.
Wilkinson & Compas, Hamilton, Ont.
Williams & Co., J. H. Brooklyn, N.Y.

BOLTS, COUPLING

Galt Machine Screw Co., Ltd., Galt, Ont.

BOLTS, STAY

Morse Sewer & Nut Co., John Ingersoll.

BOLTS, SPRING SHAKLE

Can. Winkley Co., Ltd., Windsor, Ont.

Morse Sewer & Nut Co., John Ingersoll.

BOLTS, PATCH

Morse Sewer & Nut Co., John Ingersoll.

BOLT AND NUT MACHINERY

Bertram & Sons Co., John Dundas, Ont.
Canada Machine Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto
Garlin & Son, Montreal
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Montreal, Que.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto

BOLT THREADING MACHINERY

Jardine & A. R., Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Montreal, Que.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Limited, Montreal

BORING MACHINES, PNEUMATIC CYLINDER

Cleveland Pneumatic Tool Co., Toronto
Canada Metal Co., Toronto
Garlock-Walker Machinery Co., Toronto
Garlin & Son, Montreal

BORING MACHINES, UPRIGHT AND HORIZONTAL

Canada Metal Co., Toronto
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Montreal, Que.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto

BORING AND TURNING MILLS

Bertram & Sons Co., John Dundas, Ont.
Canada Machine Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto
Landis Machine Co., Waynesboro, Pa.
National Acme Co., Montreal, Que.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.
Williams Machinery Co., A. R., Toronto

BOXES, CAST IRON
Brown & Sharpe Mfg. Co., Providence, R.I.
BOXES, STEEL SHOP AND TOTE
Crescent Steel Works Co., Cleveland
BRACKET Lining CUTTERS
Peck, Stow & Wilson Co., Southington, Conn.

BRACKS
Brown & Sharpe Mfg. Co., Providence, R.I.
Broom & Co., Hamilton, Ont.
BRASS AND COPPER BARS, RODS
BRACKS CORNICES
Peck, Stow & Wilson Co., Southington, Conn.

BRASS FOUNDERS
Canada Metal Co., Toronto
Greenleaf & Co., Belleville, Ont.
St. Lawrence Welding Co., Montreal
Tallman & Co., Montreal, Ont.
Wilson & Co., J. C., Belleville, Ont.
BRASS WORKING MACHINERY
Brown & Sharpe Mfg. Co., Providence, R.I.
Greenleaf & Co., Belleville, Ont.
Wagner & Sons Co., Cleveland, O.
New Brunswick Foundry Co., Toronto, Ont.
Peck, Stow & Wilson Co., Southington, Conn.
Wagner & Sons Co., Cleveland, O.
Wagner & Sons Co., Cleveland, O.

BRICKS, FIRE
Harrison-Walker Refractories, Montreal.
BRIDGES, RLY. AND HIGHWAY
Dodge Bros. Co., Montreal, Que.
MacKinnon Steel Co., St. John's, N.S.
BROWN RODS AND SHEETS
PLATES
Brown & Sharpe Mfg. Co., Providence, R.I.
New Toronto, Ont.

BROWN, NAVAL
Brown's Copper & Brass Rolling Mills,
New Toronto, Ont.
Canada Metal Co., Toronto
Tallman & Co., Montreal, Ont.

BROWN COPPER
Canada Metal Co., Toronto
BUFFING AND POLISHING
MACHINERY
Ford-Smith Mach. Co., Hamilton, Ont.
Ford Smith & Sply Co., Geo. F. Montreal
Garlock-Walker Machinery Co., Toronto
Williams & Wilson, Limited, Montreal.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
BUCKETS, CLAM SHELL, CRAB,
DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works Ltd., Walkerville, W. & Rockwell Co., New York, N.Y.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto
Williams & Wilson, Limited, Montreal.
BURNERS, OIL AND NATURAL
GAS
Northern Crane Works Ltd., Walkerville, W. & Rockwell Co., New York, N.Y.

BURRS, IRON AND COPPER
Perimeter & Bell Co., Gananoque.
BUSHINGS, BRONZE
Messers. Brown & Sharpe Mfg. Co., Providence, R.I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Peck, Stow & Wilson Co., Southington, Conn.

CABINETS SAND BLAST
Panorama Corporation, Hagerstown, Md.
CABLE ELECTRIC
International Machinery & Supply Co., Ltd., Montreal, Que.

CAIRNS, ROOT
Leitch Mfg. Co. of Can. Windsor, Ont.
CANADA SILVER SHEETS, ROLLS
Brown & Sharpe Mfg. Co., Providence, R.I.
Peck, Stow & Wilson Co., Southington, Conn.
CANNERS' MACHINERY
Brown & Sharpe Mfg. Co., Providence, R.I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Peck, Stow & Wilson Co., Southington, Conn.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.
CARRIAGE
Union Carbide Co., Toronto, Ont.

CARBONIZING BOXES
Can. Link-Belt Co., Toronto, Ont.
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CARRIERS, PNEUMATIC TIRE
James & Co., Montreal, Que.

CARS INDUSTRIAL
Can. Link-Belt Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.
Can. Link-Belt Co., Toronto, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.
CASTINGS, ALUMINUM, BRASS
BRONZE, COPPER, AND GUN
METAL
Aluma Steel Corp., Sault Ste. Marie, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
CASTINGS, STEEL—ALL KINDS
Lester Steel & Metals Co., Welland.
North Machin Co., Pittsburgh, Pa.

CARRIERS
COUPLING BOLTS
John Morrow Sec. & Nut Co., Ingersoll
Alexander Fleck, Ltd., Ottawa
Greenleaf & Co., Belleville, Ont.
St. Lawrence Welding Co., Montreal
Tallman & Co., Montreal, Ont.

CASTINGS, BENCH LEG.
Brown & Sharpe Mfg. Co., Providence, R.I.
CASTINGS, BRASS AND IRON
Aluma Steel Corp., Sault Ste. Marie
International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.
CASTINGS, GRAY IRON
Bertram & Sons Co., John, Dundas.
Brown & Sharpe Mfg. Co., Providence, R.I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Alexander Fleck, Ltd., Ottawa

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.
CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville
CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND
MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull.
Kennedy & Sons, Ltd., Owen Sound.

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph
CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.
CEMENT, IRON
Warman & Co., J. N., Montreal, P.Q.

CEMENT, ELASTIC JOINTING
Warman & Co., J. N., Montreal, P.Q.
CEMENT MACHINERY
Can. Fairbanks-Morse Co., Ltd., Montreal.
Garlock-Walker Machinery Co., Toronto

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas.
Bertram & Sons Co., John, Dundas.
Garlock-Walker Machinery Co., Toronto
Williams & Wilson, Limited, Montreal.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Machinery Co., Toronto

CHAINS, AGRICULTURAL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.
Brown & Sharpe Mfg. Co., Providence, R.I.
Peck, Stow & Wilson Co., Southington, Conn.

CHAINS, AUTOMOBILE ENGINE
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
CHAINS, BICYCLE, DRIVE AND
HOCK
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAINS, FOR ELEVATORS AND
CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN, MALLEABLE, DETACH-
ABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAINS, POWER TRANSMISSION
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAINS, SPROCKET WHEEL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Jones & Glasco, Montreal, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Starr Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Laboratory, Ltd., Toronto
CHISELS
Whitman & Barnes Co., St. Catharines
Garvin Machine Co., New York

CHUCKS, AERO, AUTOMATIC
Hogson & Pettis Mfg. Co., New Haven, Conn.
CHUCKS, CENTERING
Hogson & Pettis Mfg. Co., New Haven, Conn.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Smalley-General Co., Inc., Bay City, Mich.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, DRILL, LATHE AND
UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., Ashburnham, Mass.
Bicknell-Thomas Co., Greenfield, Mass.
Bertram & Sons Co., John, Dundas.

CHUCKS, FRICITION AND TAP
Bicknell-Thomas Co., Greenfield, Mass.
Victor Tool Co., Waltham, Pa.
CHUCKS, MACHINE MILLING
Hogson & Pettis Mfg. Co., New Haven, Conn.

CHUCKS, MAGNETIC
Hend Machine Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.
CHUCKS, RING WHEEL
Ford Smith Mach. Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto

CHUCKS, WHEEL, CAR
Hogson & Pettis Mfg. Co., New Haven, Conn.
CHUCKING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Garvin Machine Co., New York
Gisholt Machine Co., Madison, Wis.

CIRCULATING SYSTEMS FOR
LUBRICATING OIL
Brown & Sharpe Mfg. Co., Providence, R.I.
Williams & Wilson, Ltd., Montreal, Que.
CLAMPS, BELT
Hogson & Pettis Mfg. Co., New Haven, Conn.

CLEANERS, METER, WASTE,
GENERAL
Oakley Chemical Co., New York, N.Y.
CLEANING COMPOUND
Oakley Chemical Co., New York, N.Y.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.
CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hawling Iron Works, Inc., Chicago, Ill.

CLUTCHES, CHAIN
Wright Mfg. Co., Hudson, Ohio.
CLUTCHES, FRICTION AND
PULLEY
Bertram & Sons Co., John, Dundas.
Can. Link-Belt Co., Toronto, Ont.
Garlock-Walker Machinery Co., Toronto

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dunham Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

COILS, WIRE
Brown & Sharpe Mfg. Co., Providence, R.I.
Gray Ball Bearing Co., Ltd., Toronto
Hend Machine Co., Bridgeport, Conn.
Ford Smith Machine Co., Hamilton, Ont.

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.
COILING MACHINERY, WIRE
AND SPRING
Garlock-Walker Machinery Co., Toronto

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.

COLD ROLLED STRIP, ALL METAL
COLLARS, SHAFTING
Can. Driver-Harris Co., Ltd., Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Reeder Milling Machine Co., Boston.
Hardinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C., Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills,
New Toronto, Ont.
Canada Metal Co., Toronto, Ont.

COMPOUNDS, CUTTING AND
GRINDING, DRAWING,
STAMPING
Oakley Chemical Co., New York, N.Y.
COMBINED OPEN SIDE PLANER-
SHAPER
Lynd Farquhar Co., Boston, Mass.

COMPRESSORS, AIR
Can. Ingersoll Rand Co., Sherbrooke.
Cleveland Pneumatic Tool Co., Toronto.
C. C. Pneumatic Machy. Co., St. Louis
Elliott & Whitehall, Galt, Ont.
Garlock-Walker Machy. Co., Toronto

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley-General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Foundry & Forgings, Ltd., Wal-
land, Ont.

CONTRACT WORK
Brown Engineering Corp., Toronto
Ford-Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.

CONTROLLERS, MAGNETIC
BRAKES, ELEC. WINCHES,
MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Mach'y Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVEYORS, BELT AND CHAIN
Can. Link-Belt Co., Toronto, Ont.
Jones & Glasco, Montreal.

COOLERS, WITH DRINKING
FOUNTAINS
Puro Sanitary Drinking Fountain Co.,
Haydenville, Mass.

COPING MACHINES
Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto
Niles-Bement-Pond Co., New York
Can. Blower & Forge Co., Kitchener.

COPPER, BUS BAR, SHEET,
PATES, RODS
Brown's Copper & Brass Rolling Mills,
New Toronto, Ont.

COTTER PINS
Whitman & Barnes Co., St. Catharines.

COUNTERBORES AND COUNTER-
SINKS
Aikenhead Hardware Co., Toronto, Ont.
Blauke Co., L. C., New York City.
Cleveland Twist Drill Co., Cleveland.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

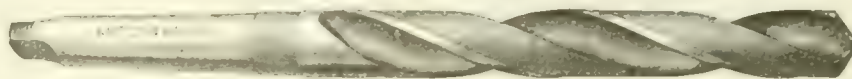
COUNTERSHAFTS
Almond Mfg. Co., Ashburnham, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Gray Ball Bearing Co., Ltd., Toronto
Hend Machine Co., Bridgeport, Conn.

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.

COILING MACHINERY, WIRE
AND SPRING
Garlock-Walker Machinery Co., Toronto

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.

IT GOES WITHOUT SAYING



WHEN YOU SEE THE NAME **"MORSE"** YOU INSTINCTIVELY THINK OF
TWIST DRILLS

BUT WHY STOP THERE? WE ALSO MANUFACTURE
 REAMERS, CUTTERS, CHUCKS, ARBORS, TAPS, DIES,
 COUNTERBORES, MANDRELS, COUNTERSINKS, GAUGES,
 SCREW-PLATES, SLEEVES, SOCKETS, TAPER PINS,
 WRENCHES, ETC.

IN ALL OF WHICH THERE IS THAT SAME
 HIGH QUALITY AND STANDARD OF EXCELLENCE

Morse Twist Drill & Machine Company
 New Bedford, Mass., U.S.A.

Thor

Electric Drills and Grinders

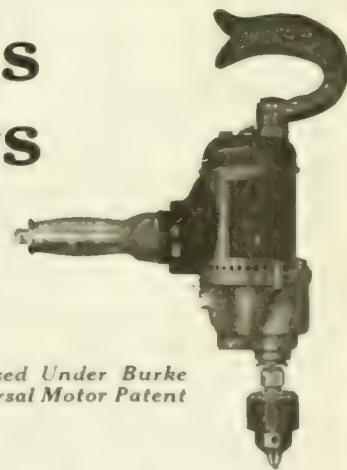
The only Electric Tools equipped
 throughout with ball and roller bearings.

Light, Powerful and Durable.

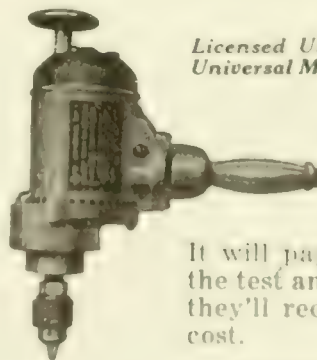
Thor Electric Tools have off-set spindles
 —which permit operating in close quar-
 ters—a variety of speeds, S K F Ball
 Bearings, four contact switches, D.C. or
 Universal Motors and several other fea-
 tures that make them the super-tools of
 the day. Jacobs Chucks used as Regular
 Equipment.

PORTABLE ELECTRIC GRINDER

Equipped with Universal Motor for Operating
 on Direct or Alternating Current
 110 TO 250 VOLTS



*Licensed Under Burke
 Universal Motor Patent*



It will pay you to put them to
 the test and let them prove that
 they'll reduce your production
 cost.

For Full Particulars Write

**Independent Pneumatic
 Tool Company**

44 St. James St., MONTREAL

Toronto: 32 Front St. W.

Winnipeg: 123 Bannockburn Ave. E.

Vancouver: 1142 Homer St.

Williams & Wilson, Limited, Montreal.

3 Minutes to Drill 20 Holes

The machine makes a total of 200 Cylinder Blocks, 100 pieces, drilled every minute. We really should say "More Drilled," for that is why this subject is possible.

A Motor Driven NATCO is doing 20 in the hour at the Harbort Machine Co. Company, Detroit—and therefore making the day 20 times as productive: the entire 20 holes are drilled at the same time. One hole at a time method would not only take 20 times as long, but would require 20 men and 20 machines.

As many as 72 holes, of various sizes, can be drilled, tapped, reamed, splined, etc., in a block at the same time. The NATCO patented feature—Independent Change of Speed for each Drill—provides the approximate correct speed for each size tool.

*Still a new machine with many advantages as you will find it
Supplies used in the plants*

We also design and build jigs and fixtures for use in connection with NATCO Multi Drillers.

The National Automatic Tool Company

Richmond, Indiana, U. S. A.

List of NATCO foreign agents:

Burton, Griffiths & Co., British Isles.
E. Isbecque & Co., Belgium.
Allied Machinery Co. of America, Italy.
Spain, Portugal and Switzerland.
Aux Forges de Vulcan, France



DRILLS, PNEUMATIC CORNER
Can. Pneumatic Tool Co. of Can.
Chicago, Ill.

Garlock-Walker Machinery Co., Toronto
Independent Pneumatic Tool Co., Chicago.

DRILLS, RATCHET AND HAND
A. R. Williams Mach. Co., Toronto, Ont.
Am. Tool & Die Co., Chicago, Ill.
Can. Tool & Die Co., Kalamazoo, Ont.
Canadian Tool & Die Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati.
Garlock-Walker Mach. Co., Toronto, Ont.
A. R. Williams Mach. Co., Toronto, Ont.
Morse & Sons & Nut Co., John, Ingersoll, Ont.

Morse Tool & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wet Twist Drill Co. of Can., Walkerville.

DRILLS, ROCK
Can. Pneumatic Tool Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto.
The Foss Mch. & Supply Co., Montreal.
A. R. Williams Mach. Co., Toronto.

DRILLS, TRUCK
Barnes & Barnes Mfg. Co., Cleveland, Ohio.
The Foss Mch. & Supply Co., Montreal.
Morrow Screw & Nut Co., J. Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

DRINKING FOUNTAINS, SANITARY
Pure Sanitary Drinking Fountain Co.,
Haverhill, Mass.

DRIVES, CHAIN
See Belting, Chain.

DRIVING TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

DRY CLEANING SYSTEM
Bosser Co., Ltd., S. F., Toronto, Ont.

DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

DRYING APPLIANCES
Raint Machine Co., Bridgeport, Conn.
W. S. Rockwell Co., New York, N.Y.

DRUM CONTROLS
Volta Manufacturing Co., Welland, Ont.

DUMP CARS
Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Leaureville Dynamo & Motor Co., Ltd.,
Toronto.

MacKinnon & Co., Montreal, Que.
A. R. Williams Mach. Co., Toronto.

ELECTRICAL SUPPLIES
Can. General Electric Co., Toronto, Ont.

ELECTRIC FURNACES
Volta Manufacturing Co., Welland, Ont.

ELECTRIC FURNACE REGULATORS, WINCHES, ROOF COOLERS AND ELECTRODE HOLDERS
Volta Manufacturing Co., Welland, Ont.

ELECTRICAL RESISTANCE MATERIALS, NICHROME, KROMORE, CHROMAX, CLIMAX, NICKEL, SILVER, ADVANCE
Can. Driver-Harris Co., Walkerville, Ont.

ELECTRIC HOISTS, STATIONARY AND MONO RAIL
Volta Manufacturing Co., Welland, Ont.

ELECTRIC MOTORS
Volta Manufacturing Co., Welland, Ont.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Elevator Co., Toronto, Ont.
Ontario Pneumatic Mach. Co., St. Louis.
Williams & Wilson, Ltd., Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Elevator Co., Toronto, Ont.
Morse Chain Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que.

EMBRASSING PRESSES
Oliver Machinery Co., Grand Rapids, Mich.

EMERY GRINDERS, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.
Emery Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Brantford Emery Wheel Co., Brantford,
Ontario.

The Foss Mch. & Supply Co., Montreal
Garlock-Walker Mach. Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton.
Foss Mch. & Supply Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Mach. & Supplies, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Truing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll

ENGINEERS—INDUSTRIAL CLEANING (Free Consultation)
Oakley Chemical Co., New York, N.Y.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester,
Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester,
Conn.
A. R. Williams Mach. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Sherbrooke, Que.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch, Gananoque, Ont.

EXHAUST HEADS AND HOODES
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Williams & Wilson, Ltd., Montreal, Que.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.

EYE PROTECTORS
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Wilson & Co., Inc., T. A., Reading, Pa.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FANS
Raint Machine Co., Bridgeport, Conn.
Can. Blower & Forge Co., Kitchener, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

FENCE, IRON AND FACTORY
Can. Wire & Iron Goods, Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloy Steel Co., Pittsburgh, Pa.

FILERS
Aikenhead Hardware Co., Toronto, Ont.
Aiken & Co., Wm., Sheffield, Eng.
Ingersoll File Co., Ltd., Ingersoll, Ont.

Morrow Screw & Nut Co., J. Ingersoll, Ont.
Marshall Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.

Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompas, Hamilton, Ont.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bosser Co., Ltd., S. F., Toronto, Ont.

FINISHING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland.

FIRE EXTINGUISHERS
Strong, Kennard & Nutt Co., Cleveland, O.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co.,
Galt, Ont.

Illinois Tool Works, Chicago, Ill.
Morton Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLAT SPRINGS
The Lumber Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wicklow Bros., Saginaw, Mich.

FLATATION MACHINERY
Elec. Steel & Metals, Welland, Ont.

FLUMES
William Hamilton Co., Peterboro, Ont.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
A. R. Langline & Co., Ltd., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.

FORGINGS, STEEL AND IRON
Blanco Co., L. C., New York City.

FORGINGS
Metals Machine Co., Pittsburgh, Pa.

Can. Found. & Forgings, Ltd., Welland.
Nova Scotia Steel & Coal Co., New
Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE FORGING AND WELDING
Blanco Co., L. C., New York City.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamp Co., Walkerville.
Steel Co. of Canada, Ltd., St. Catharines.
Victoria Foundry Co., Ottawa.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas, Ont.
Blanco Co., L. C., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Mach. Co., Toronto, Ont.
National Mach. Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

FORGINGS, SPECIAL
Armstrong-Whitworth of Can., Montreal.
Blanco Co., L. C., New York City.
Can. Found. & Forgings, Ltd., Welland.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Brown & Sharpe Mfg. Co., Providence, R.I.

FOUNTAINS, DRINKING
Pure Sanitary Drinking Fountain Co.,
Haverhill, Mass.

FRICITION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICITION SURFACE BELTING
Can. Consolidated Rubber Co., Montreal.

FUEL OIL SYSTEMS
Bosser Co., Ltd., S. F., Toronto, Ont.
Gilbert & Barker Mfg. Co., Springfield.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Bellevue Furnace Co., Detroit, Mich.
Brown & Sharpe Mfg. Co., Providence, R.I.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield.
Mechanical Engr'g Co., Three Rivers, Q.
W. S. Rockwell Co., New York, N.Y.
Standard Fuel Engr. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

FURNACES, BLAST
Bellevue Industrial Furnace Co., Detroit.
W. S. Rockwell Co., New York, N.Y.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield.
W. S. Rockwell Co., New York, N.Y.

FUSE BOXES, STEEL
Dom. Forge & Stamp Co., Walkerville.

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago.

GAS AND STEAM ENGINES
Mesta Machine Co., Pittsburgh, Pa.

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bosser Co., Ltd., S. F., Toronto, Ont.

GASOLINE TANKS
Bosser Co., Ltd., S. F., Toronto, Ont.

GASOLINE PUMPS, SELF-MEASURING
Bosser Co., Ltd., S. F., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence, R.I.

GAUGES
Elliott & Whitehall Mach. & Tool Co.,
Galt, Ont.

GAUGES, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Can., Galt, Ont.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.

Garlock-Walker Mach. Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johnson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New
Bedford.

Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 518 Stair Bldg., Toronto.
Toronto Tool Works, Toronto, Ont.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, THIRPAD
Bicknell-Thomas Co., Greenfield, Mass.

GAUGES, VACUUM AND PRESSURE
Bosser Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAUGES, SNAP, THREAD AND CYLINDRICAL
C. E. Johnson, Inc., Toronto, Ont.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal.
Dom. Found. & Steel, Hamilton, Ont.

Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR SHAPERS AND CUTTERS
Fellows Gear & Shaper Co., Springfield, V.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Fellows Gear & Shaper Co., Springfield, V.
Garlock-Walker Mach. Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.

A. R. Williams Mach. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Wks., Rochester

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CHAIN
Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING
Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE, WORM
Barter & Co., Ltd., J. R., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Elliott & Whitehall, Galt, Ont.
Gantner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Found., Ltd., Hull, Q.
Illinois Tool Works, Chicago, Ill.
Jones & Glasco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glasco, Montreal.
Philadelphia Gear Works, Philadelphia.
A. R. Williams Mach. Co., Toronto.

GENERATORS, GEAR
Fellows Gear & Shaper Co., Springfield, V.

GEARS, SPRING
Morse Chain Co., Ithaca, New York.

GEARS, SPUN, BENCH, SPIRAL
Brown & Sharpe Mfg. Co., Providence, R.I.

GEARS, SILENT CHAIN GENERATORS, STEAM TURBO
Can. General Electric Co., Toronto, Ont.

GENERAL MACHINE WORK
Elliott & Whitehall, Galt, Ont.

GENERATORS AND CONVERTORS
Can. General Electric Co., Toronto, Ont.

GENERATORS, MOTOR
A. R. Williams Mach. Co., Toronto.
Williams & Wilson, Ltd., Montreal.
MacGovern & Co., Montreal.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills,
New Toronto, Ont.

GLOVES, ASBESTOS, ACID PROOF, WATERPROOF, ETC.
Strong, Kennard & Nutt Co., Cleveland.

GLUE HEATERS
Oliver Machinery Co., Grand Rapids, Mich.

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland.
Wilson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto.
Rice Lewis & Son, Toronto.

GOGGLES
Consolidated Optical Co., Toronto.
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Wilson & Co., Inc., T. A., Reading, Pa.
Welding & Supplies Co., Montreal.

GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glasco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert,
Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (See Lubricants)

GRINDERS, AUTOMATIC KNIFE
Canada Machinery Corp., Galt, Ont.
Foss Mch. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Wisconsin Electric Co., Inc., Racine, Wis.
Can. Machinery Corp., Galt, Ont.

Don't "Leave it to George"

Canada was never lacking in war enterprise—war strategy—war efficiency. She always carried out successfully her plans of war.

Now—we must apply the same determination and energy to the plans of peace, for we now have new problems to solve.

We are faced with the great work of readjusting our country from a War to a Peace footing.

Our immediate duty is to provide the national working capital, without which it will be impossible to carry out the Plans of Peace.

Demobilization, bonuses to soldiers, civil re-establishment, credit loans to Britain for

the purchase of Canadian surplus products, ensuring continued employment to our workers. All these call for national capital, and the Victory Bonds 1919 will provide that capital.

Therefore, the success of the Victory Loan is not something that concerns "the other fellow" only.

You have a part to play.

Your individual prosperity is at stake.

YOU must support the Victory Loan just as enthusiastically as your fellow citizens.

Canada must have the money to carry out the Plans of Peace.

If things are to be kept "humming" you must

BUY VICTORY BONDS

"Every Dollar Spent in Canada"

THIS SPACE DONATED TO THE VICTORY LOAN 1919 CAMPAIGN BY

DOMINION FOUNDRIES AND STEEL, LIMITED
HAMILTON, CANADA

CLEVELAND HOSE SPECIALTIES

Bowes Automatic Air Hose Couplings Standard Equipment Everywhere

STYLE O.F. is an Outside Thread Female Pipe End. Made in sizes $\frac{1}{8}$ -inch to $1\frac{1}{2}$ -inch.

STYLE I.F. is an Inside Thread Female Pipe End. Made in sizes $\frac{1}{4}$ -inch to $1\frac{1}{2}$ -inch.

STYLE H.F. is a Female Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

STYLE H.M. is a Male Hose End with spiral shank to insert into the hose and has groove for the Never Slip Hose Clamp. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

STYLE O.M. is an Inside Thread Male Pipe End. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

STYLE I.M. is an Inside Thread Male Pipe End. Made in sizes $\frac{1}{4}$ -in. to $1\frac{1}{2}$ -in.

The Male and Female Ends of Bowes Couplings interchange in sizes $\frac{1}{4}$ -in. to $\frac{3}{4}$ -in. Sizes 1-in. and $1\frac{1}{4}$ -in. interchange. The $1\frac{1}{2}$ -in. ends interchange only with themselves.

BOWES COUPLINGS

Are instantly connected or disconnected. They are absolutely air-tight under all pressures. They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

They are made of brass and will not rust.

The Cleco Never Slip Hose Clamp Made in same sizes as Bowes Couplings

The adjoining cut of Cleco Never Slip Hose Clamp shows the "flanges" which engage the groove provided in all hose ends of Bowes Couplings. The "Model Hose Line" illustrated shows correct styles of couplings and valve to use and proper way to attach the clamps.



CLECO GROOVED HOSE NIPPLE



Grooved Nipples when attached to hose with the wire clamp cannot "blow out," as one-half of the Wire Clamp fits in Nipple groove, and the other half on the hose, holding nipple and hose permanently.

WIRE CLAMP TOOL

To apply Wire Clamps to Grooved Hose Nipples you need the Wire Clamp Tool. It is a small hand-operated tool, of moderate cost, which we can send you for your own use or for your customers.



Use Annealed Wire No. 14

Read the following Clamping Hammer, Equipment, Air Line, Gun, etc. Also, the following Clamping Hammer, Equipment, Air Line, Gun, etc.

Write for Bulletin 43 illustrating Cleco Hose Fittings, Couplings, Valves, etc.

IMPORTANT: The Small Leaks in your "AIR LINE" mean serious loss in DOLLARS. Have you any idea of the amount of "Air" wasted in small leaks at your connections? Air Leakage through 1-16 in. opening equals 532 cu. ft. per minute at 90 lbs. It will pay you to install Bowes Couplings and stop costly leaks.

Write for Bulletin 34A, 41 and 43.

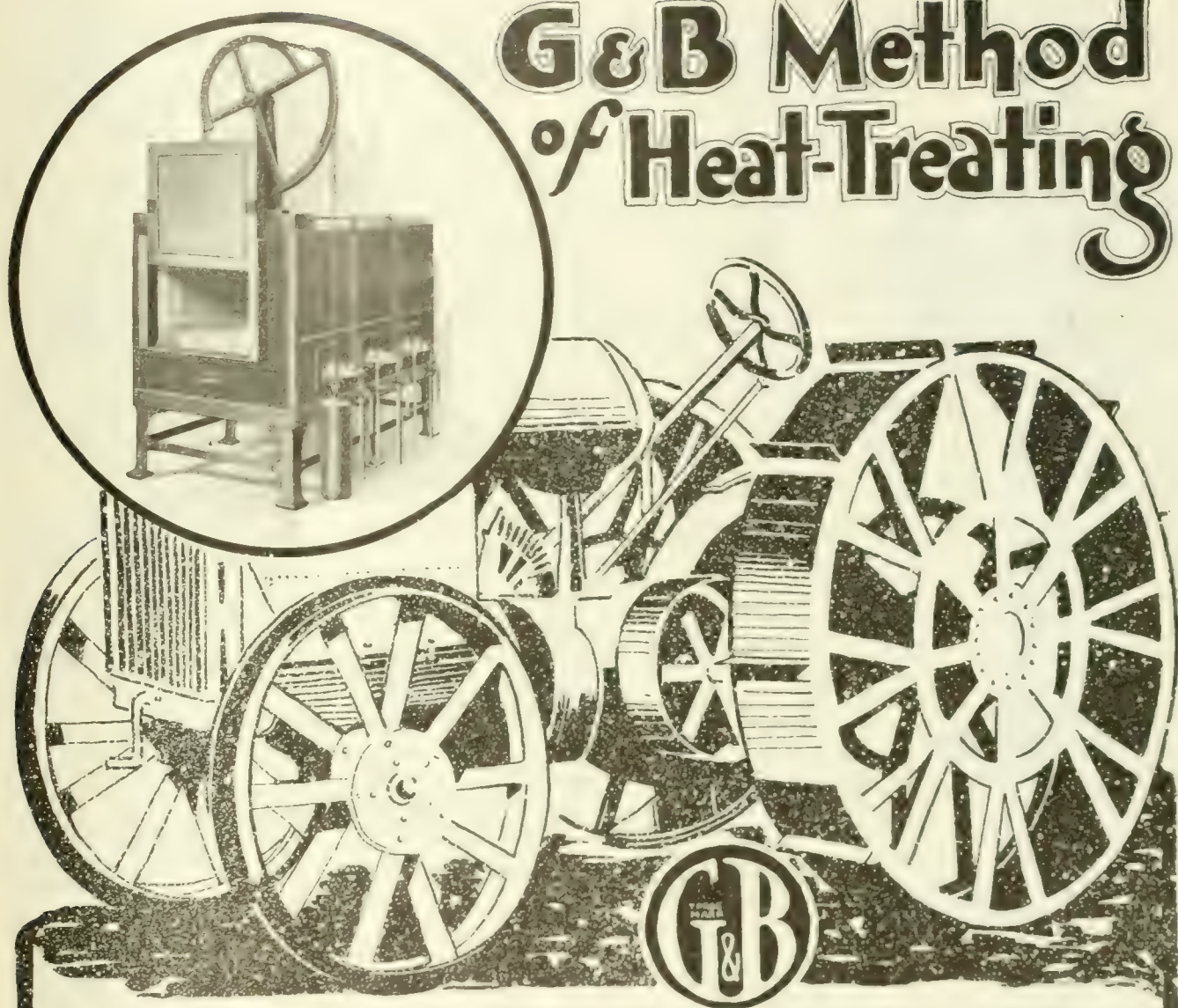
CLEVELAND PNEUMATIC TOOL CO. OF CANADA LTD., 84 Chestnut St., TORONTO
A. R. WILLIAMS MACHINERY CO. TORONTO, 347 Craig St. W. MONTREAL. WILLIAMS & WILSON, MONTREAL

If interested, send out this page and place with letters to be answered

Volume XXII

$$A = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \quad P = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, \quad Q = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

G & B Method of Heat-Treating



Gilbert & Barker Method the Right Method of Heat-Treating

Used by the Largest Manufacturers of Autos and Trucks.

Whether you manufacture tractors—automobiles—trucks—crankshafts—camshafts—tools—machine parts or anything else that requires heat-treating unless you have the **right** kind of heat-treating furnace for the purpose, you are defeating your own purpose, that of turning out a first-class product of uniform high quality.

**GILBERT & BARKER FURNACES INSURE
PERFECT COMBUSTION—ABSOLUTE TEMPERATURE CONTROL
UNIFORMITY OF HEAT**

the result of which is an exceptionally high grade product which measures up to the best manufacturing standards. There is a G & B. Furnace exactly suited to your requirements. Let our engineers advise you; write. To-day is a better day than to-morrow to send for Bulletin 24.

Gilbert & Barker Manufacturing Company

17 Union Street

Springfield, Mass.

ESTABLISHED 1865

New York Office: 26 Broadway

Canadian Agents: Williams & Wilson, Limited, Montreal, Que.

Hendley Machine Co., Torrington, Conn.
W. & J. H. Brooklyn, N.Y.

LATHES, AUTOMATIC AND SEMI-AUTOMATIC
Gisholt Machine Co., Madison, Wis.
Wood Turret Machine Co., Brazil, Ind.

LATHES, AXLE
Bridgeport Mach. Tool Works, Rochester

LATHES, BORING
Bridgeport Mach. Tool Works, Rochester
Lodge & Shipley, Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, PRECISION, BENCH
W. F. & John Barnes Co., Rockford, Ill.
J. G. Blount & Co., Everett, Mass.
Canadian Fairbanks-Morse Co., Montreal
Geo. E. Fess Machy. & Supply Co., Montreal

Garrett-Walker Machinery Co., Toronto
Harrison Bros., Chicago, Ill.
Pratt & Whitney Co., Dundas, Ont.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, BRASS
Acme Machine Tool Co., Cincinnati, Ohio.
Hastings Bros., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, ENGINE
Acme Machine Tool Co., Cincinnati, Ohio.
John Harrison & Sons Co., Dundas, Ont.
Hastings Bros., Chicago, Ill.
Wood Turret Machine Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

Canadian Fairbanks-Morse Co., Montreal
Crescent Machine Tool Co., Cincinnati, Ohio.
Wayne Bros., Saginaw, Mich.
G. F. Fess Machy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto.
Gisholt Machine Co., Madison, Wis.
Kennedy & Sons, Wm., Owen Sound, Ont.
R. McKeagall Co., Galt.

Miles-Bement-Pond Co., New York.
Wood Turret Machine Co., Rampton
Smalley-General Co., Inc., Bay City, Mich.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Bridges Tool Co., Skidder, Ohio.
Walcott Lathes Co., Jackson, Mich.
Whitcomb-Hastell Mach. Tool Co., Worcester, Mass.

A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Worcester Lathes Co., Worcester, Mass.

LATHES, FOOT POWER
Seneca Falls Mfg. Co., Seneca Falls, N.Y.

LATHES, HORIZONTAL
Wood Turret Machine Co., Brazil, Ind.

LATHES, JOURNAL TRUING
Bridgeport Mach. Tool Works, Rochester.

LATHES, MANDRELS, HARDENED AND GROUND
Hess & Wenzel, Galt, Ont.

LATHES, PATTERNMAKERS'
J. G. Blount & Co., Everett, Mass.
Can. Machinery Corp., Galt.
Wood Turret Machine Co., Brazil, Ind.
G. F. Fess Machy. & Supply Co., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, POLISHING
Greenfield Tap & Die Corp., Greenfield, Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, SCREW CUTTING
Bertram & Sons Co., John, Dundas, Ont.
Bridgeport Mach. Tool Works, Rochester.
Canada Machinery Corp., Galt, Ont.
Crescent Machine Tool Co., Cincinnati, O.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Hastings Bros., Inc., Chicago, Ill.
Hastings Ltd., John T., Toronto, Ont.
Miles-Bement-Pond Co., New York.
Wood Turret Machine Co., Rampton.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Hastell Mach. Tool Co., Worcester, Mass.

Wicks Bros., Saginaw, Mich.
Williams Machy. Co., A. R., Toronto.
Wood Turret Machine Co., Brazil, Ind.
Worcester Lathes Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, SPINNING
Riley Co., E. W., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

LATHES, TOOL ROOM
Crescent Machine Tool Co., Cincinnati, O.
Garlock-Walker Machinery Co., Toronto, Ont.
Hastings Bros., Inc., Chicago, Ill.
Hastings Ltd., John T., Toronto, Ont.
Miles-Bement-Pond Co., New York.
Wood Turret Machine Co., Rampton.
Seneca Falls Mfg. Co., Seneca Falls, N.Y.
Whitcomb-Hastell Mach. Tool Co., Worcester, Mass.

LEAD BURNING
St. Lawrence Welding Co., Montreal

LEAD BURNING OF FITS
Turner Bros. Works, Syracuse, N.Y.

LEATHER STRAPPING
Gorton & Sons Mfg. Co., Worcester, Mass.

LENSES FOR GOGGLES
Hastings Bros., Inc., Chicago, N.Y.

LETTERS AND FIGURES, METAL
Garlock-Walker Machinery Co., Toronto, Ont.

LIDS, SCREW TOP AND HINGE
Can. Machinery Co., Ltd., Windsor, Ont.

LINER BELTING
See Belting, Chalm.

LITHOGRAPH MILL MACHINERY
Barnes & Co., Pittsburgh, Cleveland

LOCKERS, STEEL WARDROBE AND STEEL MATERIAL
Canada Wire & Iron Gds. Co., Hamilton
Dennis Wire & Iron Works, London, Ont.

LUBRICANTS
Outaract Refining & Mfg. Co., Toronto.

LUBRICANTS, CUTTING AND GRINDING, DRAWING, STAMPING
Gisholt Machine Co., Madison, Wis.

LUBRICATING, OIL FILTERING AND CIRCULATING SYSTEMS
Bousier Co., Ltd., S. F., Toronto, Ont.

LUBRICATORS
Trabern Pump Co., Rockford, Ill.

LUMBERMEN'S TOOLS
Thos. Pink Co., Ltd., Pembroke, Ont.

MACHINE COUNTER WEIGHTS
Katie Foundry, Galt, Ont.

MACHINE TOOLS
See Mach. Tool Co., Rampton

MACHINERY, CORNER AND BENDING
Peck, Stow & Wilcox, Southington, Conn.

MACHINERY DEALERS
Archibald & Co., Chas. P., Montreal.
Can. Fairbanks-Morse Co., Montreal.
Dillhoff & Whitehall, Galt, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MACHINERY GUARDS (See Guards)

MACHINERY, SPECIAL
Hogson & Peths Mfg. Co., New Haven, Conn.

MACHINISTS' TOOLS
Brown & Sharpe Mfg. Co., Providence, R.I.

MAGNETIC BRAKES FOR ELECTRIC MOTORS
Vesta Mfg. Co., Welland, Ont.

MANDRELS
Hess & Wenzel, Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Jardine & Co., A. B., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.

Pratt & Whitney Co., Dundas, Ont.

MARKING DEVICES
Pritchard-Andrews Co., of Can., Ottawa.
Matthews & Co., Jas. H., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Perrin, Wm. R., Toronto.

Williams & Wilson, Ltd., Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bousier Co., Ltd., S. F., Toronto, Ont.

MEASURING TAPES AND RULES
Chesterman & Co., Jas., Sheffield, Eng.

METALLURGISTS
See Chemists.

METAL CLEANERS
Gisholt Machine Co., Madison, Wis.

METAL SAWS
See Saws.

METAL SAWS, POWER
Hoefler Mfg. Co., Freeport, Ill.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.

METAL, STAMPINGS, SMALL
Can. Whitley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bousier Co., Ltd., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., Ashburham, Mass.
Taylor, J. A. M., 319 Stair Bldg., Toronto

Williams & Wilson, Ltd., Montreal, Que.

MILLS, BRACE AND TUBE
Elec. Steel & Metals, Welland, Ont.

MILLS, SAND
Front Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield, Wells Bros. of Canada, Galt, Ont.

MILLING ARBOR
Brown & Sharpe Mfg. Co., Providence, R.I.
Reamer & Trecker Co., Milwaukee, Wis.

MILLING ATTACHMENTS
Recker Milling Machine Co., Boston, Mass.
Bertram & Sons Co., John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Crescent Machine Tool Co., Cincinnati, O.
Ford-Smith Mach. Co., Hamilton, Ont.
Hastings Bros., Inc., Chicago, Ill.
Hastings Ltd., John T., Toronto, Ont.
Hendley Machine Works, Hunkley, Wis.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnard & Co., Inc., Rock Island, Que.
Blanco Co., L. C., New York City.
Cleveland Milling Machine Co., Cleveland.
Reamer & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hastings Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempthorne Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Elec. Steel & Metals, Welland, Ont.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

Pratt & Whitney Co., Dundas, Ont.
Tait-Pierce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bristol Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I.
Bodie Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Barnard & Co., Inc., Rock Island, Que.
Blanco Co., L. C., New York City.
Cleveland Milling Machine Co., Cleveland.
Reamer & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hastings Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto, Ont.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLAIN, BENCH AND UNIVERSAL
Becker Milling Machine Co., Boston, Mass.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Cleveland Milling Machine Co., Cleveland.
Cincinnati Milling Machine Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.
Miles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PLATE
Marshalltown Mfg. Co., Marshalltown, Ia.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Machy. & Supply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto, Ont.
Garrin Machine Co., New York.
Gooley & Edmund, Cortland, N.Y.
Hastings Bros., Inc., Chicago, Ill.
Hendley Machine Co., Torrington, Conn.
Reamer & Trecker Co., Milwaukee, Wis.
Kempthorne Mfg. Co., Milwaukee, Wis.

Heat Under Accurate Control

Here is an important factor in the heat treatment of metals. An intense heat, rapidly developed, and always under accurate control of the operator, are features that distinguish

BELLEVUE FURNACES

These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counterbalanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.

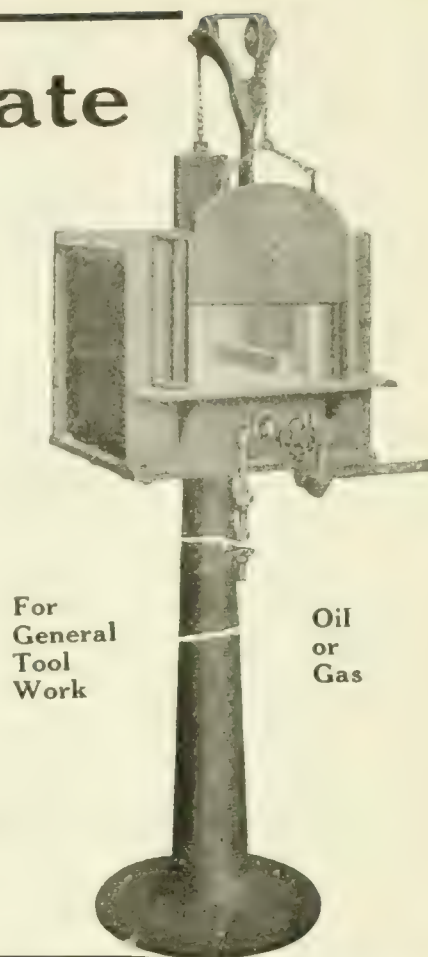
Let us advise you about your heat-treating problems.

Bellevue Industrial Furnace Company

Julius C. Hinz, President

703 Bellevue Ave. - Detroit, Mich.

Representatives in Canada: H. W. PETRIE, LIMITED, Toronto, Canada



Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative

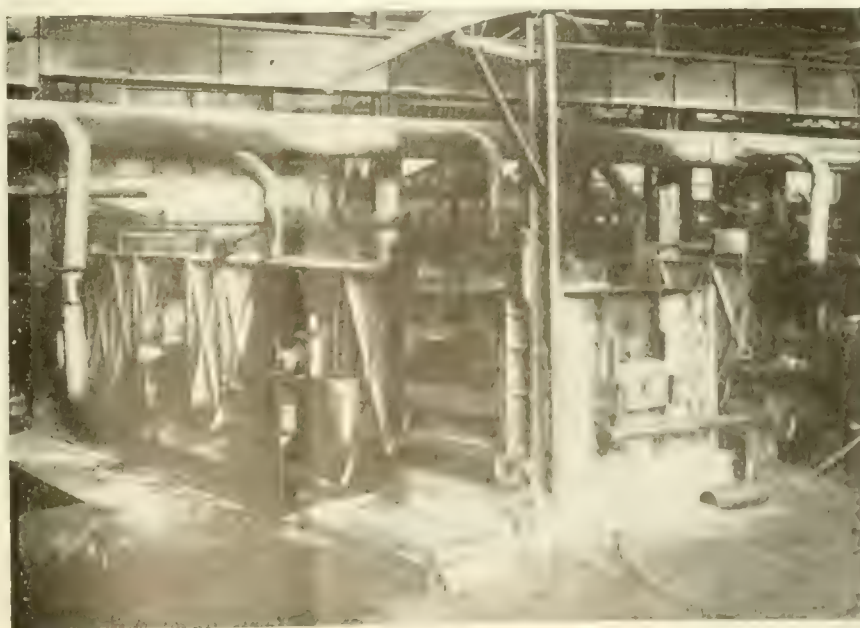
judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.

Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

Write

Mechanical Engineering

Company, Limited
Room 308, Bank of Toronto Bldg., Montreal
Three Rivers, Quebec, Canada



Electric Furnaces and Equipment

THURY REGULATORS, NEW TYPE

ELECTRODE WINCHES

ELECTRODE HOLDERS

MAGNETIC BREAKS

ROOF COOLER RINGS

HAND CONTROLS

BUSS BARS SYSTEMS

ELECTRIC FURNACES

FOR SMELTING FERRO ALLOYS AND REFINING STEEL

PORTABLE ELECTRIC HOISTS,

MONO RAIL HOISTS,

GENERAL CONSULTING

VOLTA MANUFACTURING CO.
WELLAND, ONTARIO

REAMERS, PIN

Blanco Co., L. C. New York City.
Greenfield Tap & Die Corp., Greenfield,
Mass. Screw & Nut Co., John, Ingersoll,
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

REAMER FLUTING MACHINES

Garrin Machine Co., New York.
REAMING MACHINES, PNEUMATIC
Cleveland Pneumatic Co. of Can., Toronto
Garlock-Walker Machinery Co., Toronto.

RECORDING INSTRUMENTS

Bristol Co., Waterbury, Conn.
Orbalt Machine Co., Madison, Wis.
Taylor Instrument Co., Rochester, N.Y.

REELS, WIRE AND TEXTILE MFG.

American Pulley Co., Philadelphia, Pa.

REGULATORS, AUTOMATIC

Electric Steels & Metals, Ltd., Welland.

REGULATORS, PRESSURE,

TEMPERATURE

Can. Fairbanks-Morse Co., Montreal.
Taylor Instrument Co., Rochester, N.Y.

REPAIR WORK, ALL KINDS

Elec Steel & Metals, Welland, Ont.

RESPIRATORS

Strong, Kennard & Nutt Co., Cleveland.

RIVETS.

Aikenhead Hardware Co., Toronto, Ont.
Farmer & Bullock Co., Gananoque,
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton.

RIVETERS, PNEUMATIC, HYDRAU-

LIC, HAMMER, COMPRESSION

Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Can.,
Toronto.

Garlock-Walker Machinery Co., Toronto,
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC,

ROTARY BLOW

Grant Mfg. & Machine Co., Bridgeport,
High-Speed Hammer Co., Rochester,
Williams & Wilson, Ltd., Montreal.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT

Can. Ingersoll-Rand Co., Ltd., Sherbrooke.

RODS, HIGH SPEED AND CARBON

DRILL

Blanco Co., L. C. New York City.

RODS, ROPE AND SPRING

Page Steel & Wire Co., Adrian, Mich.

RODS, PURE NICKEL, MONEL

METAL, NICHROME

Can. Driver-Harris Co., Ltd., Walkerville.

ROLL ENGRAVING

Hogson & Pettis Mfg. Co., New Haven,
Conn.

ROLLER CHAINS

Can. Link-Belt Co., Toronto.
Jones & Glasco, Montreal.

ROLLS, BENDING, STRAIGHTENING

John Bertram & Sons Co., Dundas,
Brown, Boggs & Co., Ltd., Hamilton,
Can. Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

ROLLS AND TABLES

Elec Steel & Metals, Welland, Ont.

ROOFING

H. H. Robertson, Ltd., St. Catharines, Ont.

ROPE, GALV, MONEL METAL,

BRONZE, TILLER AND SASH

CORD

Can. Driver-Harris Co., Ltd., Walkerville

ROTARY SHEARS

The Quickwork Co., St. Mary's, Ohio

ROOF COOLERS

Electric Steels & Metals, Ltd., Welland.

ROLLING MACHINES, SHEET

METAL

Machine & Tool Co., Grand
Rapids, Mich.

ROLLING MILL MACHINERY

Monte Machine Co., Pittsburgh, Pa.

ROLL LATHES

Monte Machine Co., Pittsburgh, Pa.

ROLLS, BENDING, STRAIGHTEN-

ING

Machine & Tool Co., Grand
Rapids, Mich.

ROLLS, CRUSHING

Can. Link-Belt Co., Toronto.

ROLL ENGRAVINGS

Hogson & Pettis Mfg. Co., New Haven,
Conn.

RUBBER MFG. SUPPLIES

Hogson & Pettis Mfg. Co., New Haven,
Conn.

RUBBER MOUNDS AND CORES

Can. Link-Belt Co., Toronto.

RUBBER MILL MACHINERY

Bestmeyer Ltd., Pittsburgh, Pa.

RULES

Blanco & Shaw Mfg. Co., Providence,
Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton.

RULES, STEEL, STRAIGHT, AND

FOLDING

Blanco Co., L. C. New York City.

RULES, ROLLOUT FOLDING

Blanco Co., L. C. New York City.

RULES, BOARD AND LONG

Link Rule Co. of Can., Windsor

RUST PREVENTATIVES

Oakley Chemical Co., New York, N.Y.

SAW MILL CONVEYORS

Can. Link-Belt Co., Toronto.

SAFETY DEVICES

Williams & Wilson, Ltd., Montreal, Que.

SAND MILLS

Strong, Kennard & Nutt Co., Cleveland.

SAND-BLAST EQUIPMENT

Prost Mfg. Co., Chicago, Ill.

SAND-BLAST SUPPLIES AND

ACCESSORIES

Pangborn Corporation, Hagerstown, Md.

SAFETY APPLIANCES

Strong, Kennard & Nutt Co., Cleveland.

SAFETY APPLIANCE GOGGLES

T. A. Wilson Co., Inc., Reading, Pa.

SAND-BLAST ABRASIVES

Pangborn Corporation, Hagerstown, Md.

SAND MIXING MACHINERY

Pittsburgh Oneshed Steel Co., Pittsburgh.

SANITARY DRINKING FOUNTAINS

Pum Sanitary Drinking Fountain Co.,
Hawthorne, Ill.

SANDERS, DISC AND SPINDLE

Can. Sander Mfg. Co., Brockville, Ont.

SANDING MACHINES

Can. Sander Mfg. Co., Brockville, Ont.

SAW MILL MACHINERY

Can. Fairbanks-Morse Co., Montreal.
Robert Gardner & Son, Montreal.
Curtis Pneumatic Machy Co., St. Louis.
A. R. Williams Machy Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

SAW SPRINGS

The Dunbar Brothers Co., Bristol, Conn.

SAWS, CIRCULAR METAL

Wm. Atkins & Co., Ltd., Sheffield, Eng.

SAWS, SLITTING

Hunter Saw & Machine Co., Pittsburgh.
Marshall, Son & Runney, Toronto.
Plews Ltd., Winnipeg, Man.
Simonds Mfg. Co., Pittsburgh, Mass.
Tabor Mfg. Co., Philadelphia, Pa.

SAWS, HACK (See Hack Saws)

Greenfield Tap & Die Corp., Greenfield,
Hunter Saw & Machine Co., Pittsburgh.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING

J. A. M. Taylor, Stair Bldg., Toronto.

SCALES, MECHANICS'

Luftkin Rule Co. of Can., Windsor.

SCALOSCOPES

Shore Instrument & Mfg. Co., New York

SCREENING MACHINERY

Can. Link-Belt Co., Toronto.

SCREW DRIVERS

W. L. Man & Barnes Co., St. Catharines.

SCREW EXTRACTORS

Cleveland Twist Drill Co., Cleveland.

SCREW MACHINES, HAND,

AUTOMATIC

Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machy Co., Ltd., Toronto
Garrin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield,
N. B. Jarline & Co., Hespeler.
National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Danbury, Ont.
Wells Bros. of Can., Galt, Ont.
Warner & Swasey Co., Cleveland, O.
A. R. Williams Machy Co., Toronto
Wood Turret Mach Co., Brazil, Ind.
Williams & Wilson, Ltd., Montreal, Que.

SCREWS, MACHINE, SET, CAP

AND SPECIAL

Galt Machine Screw Co., Galt.
John Morrow Screw & Nut Co., Ingersoll.
National Acme Co., Montreal.
Rice, Lewis & Son, Toronto.
Steel Co. of Canada, Ltd., Hamilton.
Wilkinson & Kompass, Hamilton.

SCREW COLLARS

Galt Machine Screw Co., Ltd., Galt, Ont.

SCREW MACHINES, PLAIN

WIRE FEED

Brown & Sharpe Mfg. Co., Providence, R. I.

SCREW PLATES

Greenfield Tap & Die Corp., Greenfield,
N. B. Jarline & Co., Hespeler.
Morse Twist Drill & Mach. Co., New
Bedford, Mass.

SCREWS, SAFETY SET

Galt Machine Screw Co., Ltd., Galt, Ont.

SCREW SLOTS

Can. Fairbanks-Morse Co., Montreal.
National Acme Co., Cleveland, O.
Pratt & Whitney Co., Danbury, Ont.

SEPARATORS, MOISTENERS

AND OIL FOR COMPRESSED

AIR

Pangborn Corporation, Hagerstown, Md.

SELF-OPENING DIES

See Dies.

SEPARATORS, SAND

Pangborn Corporation, Hagerstown, Md.

SET SCREWS, SAFETY

Aikenhead Hardware Co., Toronto.
Bristol Co., Waterbury, Conn.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wilkinson & Kompass, Hamilton.

SHANKS, STRAIGHT AND TAPER

Jacobs Mfg. Co., Hartford, Conn.

SHAPERS

John Bertram & Sons Co., Dundas.
Can. Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt.
Geo. F. Foss Michy & Sply Co., Montreal.
Robt. Gardner & Son, Montreal.
Garlock-Walker Machy Co., Toronto.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton.
Milwaukee Shaper Co., Milwaukee, Wis.
Rice, Lewis & Son, Toronto.
Williams & Wilson, Ltd., Montreal.

SHAPERS, GEAR

Fellows Gear & Shaper Co., Springfield, V.

SHAFTING

Algoma Steel Corp., Sault Ste. Marie, O.
Can. Fairbanks-Morse Co., Montreal.
Garlock-Walker Machy Co., Ltd., Toronto
Jones & Glasco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton.
Pratt & Whitney Co., Dundas.
Rice, Lewis & Son, Toronto.
A. R. Williams Machy Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

SHARPENING STONES

Norton Co., Worcester, Mass.
Rice, Lewis & Son, Toronto.

SHEARING MACHINES, ANGLE

IRON, BAR AND GATE

John Bertram & Sons Co., Dundas.
Bertrams Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy Co., Ltd., Toronto
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

SHEARS, POWER

John Bertram & Sons Co., Dundas.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Ltd., Hamilton.
Can. Blower & Forge Co., Kitchener.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy Co., Ltd., Toronto
Long & Allstair, Hamilton, Ohio.
Wicks Bros., Saginaw, Mich.
A. R. Jardine & Co., Hespeler, Ont.
National Machy Co., Tiffin, Ohio.
Niles-Bement-Pond Co., New York.
H. D. Stoll Co., Inc., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

SHEARS, ROTARY

Marshalltown Mfg. Co., Marshalltown, Ia.
The Quickwork Co., St. Mary's, Ohio.

SHEARS, PNEUMATIC

Toledo Machine & Tool Co., Toledo, Ohio

SHEET METAL ROLLING

MACHINES

Peck, Stow & Wilcox Co., Southington

SHEETS, NICKEL, RESIST, ALLOY

Can. Driver-Harris Co., Ltd., Walkerville.

SHEARS, PLATE CUTTING,

SLITTING

Marshalltown Mfg. Co., Marshalltown, Ia.
Quickwork Co., St. Mary's, Ohio.

SHEARS, SPLITTING

Marshalltown Mfg. Co., Marshalltown, Ia.
Peck, Stow & Wilcox Co., Southington

SHEARS, IRREGULAR AND

CIRCLE CUTTING

The Quickwork Co., St. Mary's, Ohio.
D. H. Stoll Co., Inc., Buffalo, N.Y.

SHEET METAL MACHINERY

Peck, Stow & Wilcox Co., Southington, C.

SHEARS, SERPENTINE

The Quickwork Co., St. Mary's, Ohio

SHEARS, SQUARING

Brown, Boggs & Co., Hamilton, Ont.
D. H. Stoll Co., Inc., Buffalo, N.Y.

SHEET METAL WORKING TOOLS

Bain Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton.
Peck, Stow & Wilcox Co., Southington, C.
D. H. Stoll Co., Inc., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal.
SHEETS, CRUCIBLE, CAST

Kaiser-Edison & Co., Ltd., Montreal.
Ralph B. Norton, Agent Montreal

SHEET METAL WORKING

MACHINERY

D. H. Stoll Co., Inc., Buffalo, N.Y.

SHELVING, STEEL

Dennis Wire & Iron Works, London

SHIPYARD MACHINERY, SHOP

FURNITURE

Dennis Wire & Iron Works, London

SIDE TOOLS

Armstrong Bros. Tool Co., Chicago

J. H. Williams & Co., Brooklyn, N.Y.

SILENT CHAINS

Can. Link-Belt Co., Toronto, Ont.

Jones & Glasco, Montreal.

SLEDGES

Aikenhead Hardware Co., Toronto, Ont.

Rice, Lewis & Son, Toronto, Ont.

Whitman & Barnes Mfg. Co., St.
Catharines, Ont.

Wilkinson & Kompass, Hamilton, Ont.

SLEDGES, CAST IRON

Katie Foundry, Galt, Ont.

SLINGS, CHAINS

Morris Crane & Hoist Co., Herbert,
Niagara Falls, Ont.

SLOTTERS

Betta Machine Co., Rochester, N.Y.

Garrin Machine Co., New York.

National Acme Co., Cleveland, Ohio.

Niles-Bement-Pond Co., New York.

SMOKESTACKS

William Hamilton Co., Peterboro, Ont.

MacKinnon Steel Co., Sherbrooke, Que.

SNIPS, TINNERS AND SHEET

METAL WORKERS

Kearney & Trecker Co., Milwaukee, Wis.

J. Morrow Screw & Nut Co., Ingersoll, Ont.

Morse Twist Drill & Mch. Co., New
Bedford, Mass.

Rice, Lewis & Son, Toronto, Ont.

Whitman & Barnes Mfg. Co., Akron, O.

SOIL PIPE FITTINGS, CAST IRON

Katie Foundry, Galt, Ont.

SOLDERING IRONS

Aikenhead Hardware Co., Toronto, Ont.

Brown, Boggs & Co., Hamilton, Ont.

Prent-O-Lite Co., Inc., Toronto, Ont.

Rice, Lewis & Son, Toronto, Ont.

SOLDER

Aikenhead Hardware Co., Toronto, Ont.

Canada Metal Co., Ltd., Toronto, Ont.

Rice, Lewis & Son, Toronto, Ont.

Tallman Brass & Metal Co., Hamilton.

SPEED REDUCING GEARS

Can. Link-Belt Co., Toronto, Ont.

Jones & Glasco, Montreal.

SLICING CLAMPS

Peck, Stow & Wilcox Co., Southington,
Conn.

SPRINGS, MACHINERY

Barnes, Wallace Co., Bristol, Conn.

Can. Steel Foundries, Ltd., Montreal.

Cleveland Wire Spring Co., Cleveland.

Dunbar Bros. Co., Bristol, Conn.

Garlock-Walker Machinery Co., Toronto.

Jas. Steele, Ltd., Guelph, Ont.

SPECIAL MACHINERY

Baird Machine Co., Bridgeport, Conn.

Bertram, John, & Sons Co., Dundas.

Bliss, E. W. Co

OBTAIN THE BEST RESULTS

From Cutters and Tools Kept Sharp on GARVIN No. 3 UNIVERSAL CUTTER AND SURFACE GRINDERS

Simple Light Running Accurate

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 14" x 6"; SURFACES, 9½" x 6"

For Further Information ASK YOUR DEALER
or WRITE US DIRECT

IMMEDIATE DELIVERIES

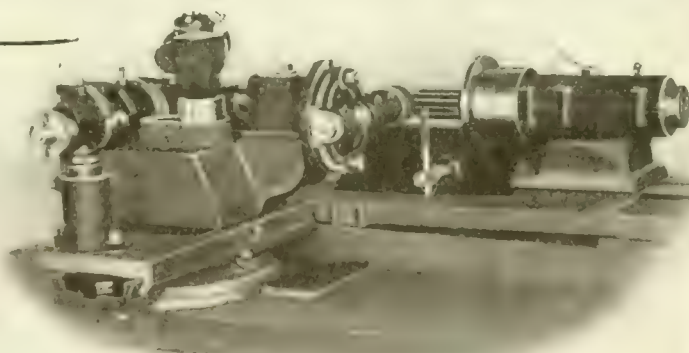
Send for Complete Catalog

GARVIN No. 3, Universal Cutter
and Surface Grinder
Use Code—Banish

THE GARVIN
Spring and Varick Streets

Manufactured by
MACHINE COMPANY
(Visitors Welcome) 50 Years New York City

Easy to Operate Landis Universal Grinding Machines



Backing-off Straight Reamer

Their application is practically unlimited, combining, as they do, both an external and internal grinding machine.

Besides, they are economical, and moreover, all they can be operated by the use of the automatic, hand, side mill grinding attachment, gear cutter grinding attachment, etc. (See sketch herewith).

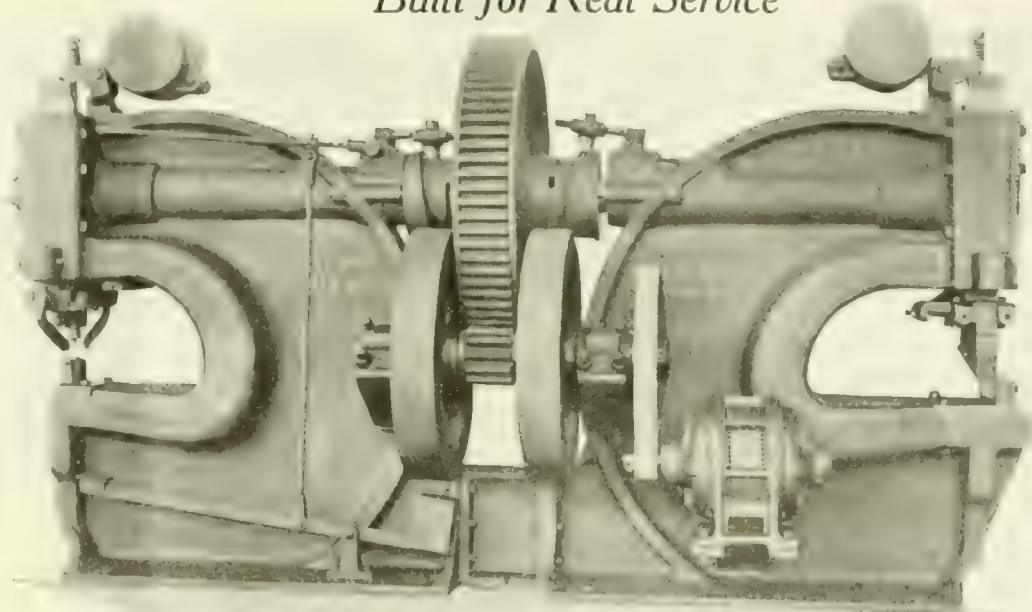
Landis Tool Company
Waynesboro, Pa.

LANDIS

If interested, send this page and place with letters to be answered.

WICKES' Heavy Duty Double Punch

Built for Real Service

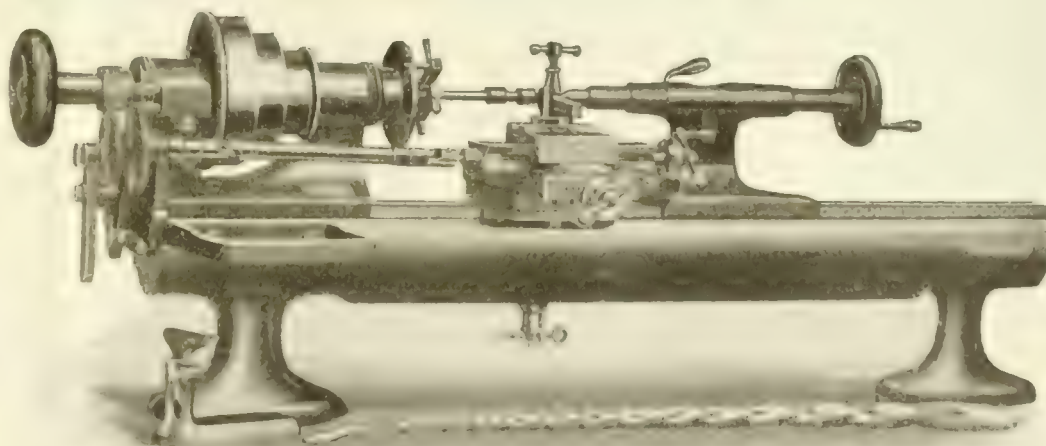


We also manufacture High Grade Horizontal and Vertical Rolls, Angle Rolls, Single Punches, Shears, Spruce Cutters, Radial Wall Drills or Counter-sinking Machines, Flanging Clamps and Heavy Duty Engine Lathes. *Ask for Catalogue.*

WICKES BROS., SAGINAW, MICH., U.S.A.

CATARACT BENCH LATHES AND ATTACHMENTS

Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. Study this illustration. Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



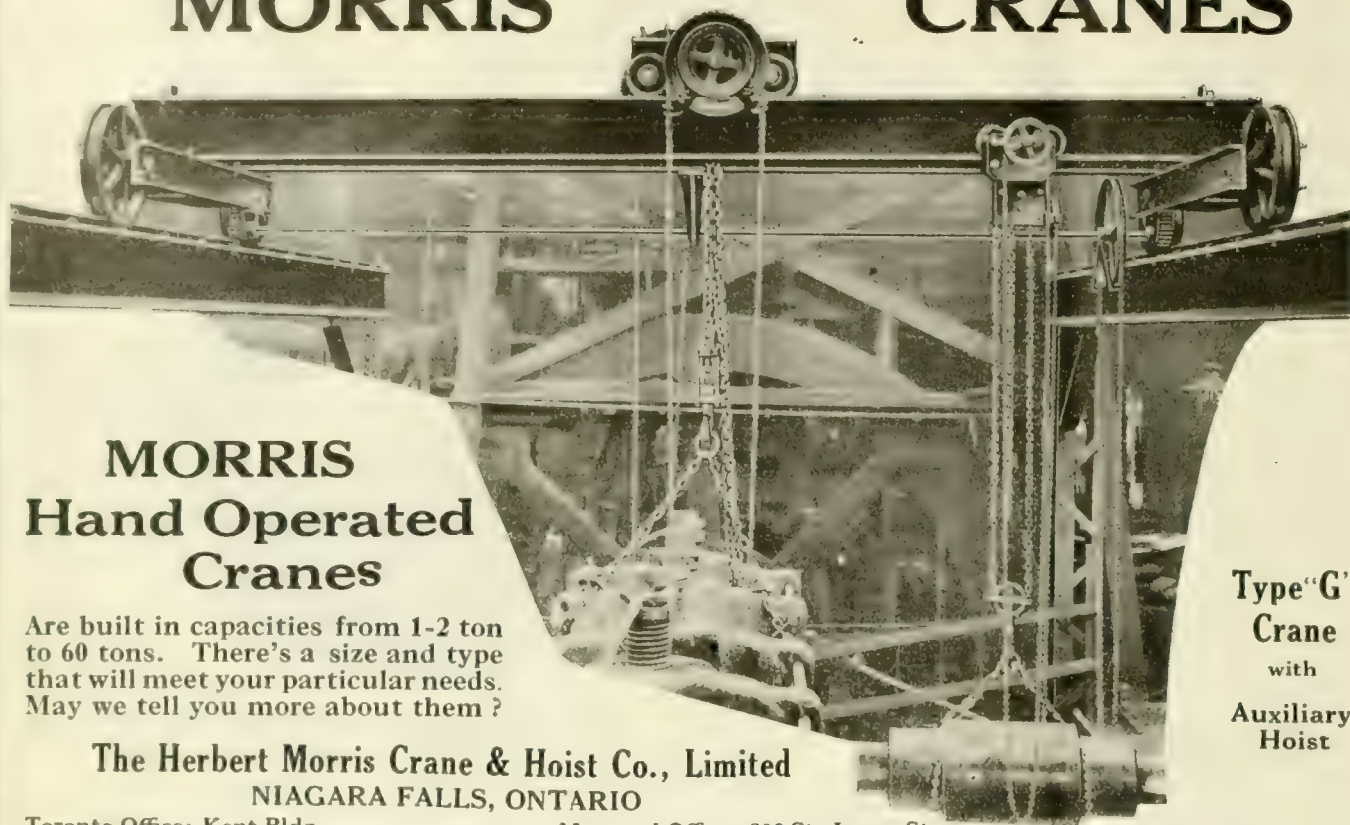
Hardinge Bros., 1770 Bertau Avenue, Chicago, Ill.

ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.

If interested tear out this page and place with letters to be answered.

MORRIS

CRANES



MORRIS Hand Operated Cranes

Are built in capacities from 1-2 ton to 60 tons. There's a size and type that will meet your particular needs. May we tell you more about them?

The Herbert Morris Crane & Hoist Co., Limited
NIAGARA FALLS, ONTARIO

Toronto Office: Kent Bldg.

Montreal Office: 296 St. James St.

**Type "G"
Crane
with
Auxiliary
Hoist**

TRUCKS, FACTORY, FREIGHT, ETC

Amson Machinery Corp., Galt, Ont.
 Chapman Double Ball Bearing, Toronto.
 MacKenzie Steel Co., Sherbrooke, Que.
 Ross Lewis & Son, Toronto, Ont.

TRUCKS, LUMBER AND KILN

Swedish Steel & Importing Co., Montreal.
 Northern Crane Works, Walkerville.
TUBING, SEAMLESS, BRASS AND

COPPER

Standard Tube & Pipe Co., Woodstock.
 Taitman Bros. A. Metal Co., Hamilton.

TUBING COILERS, FLEXIBLE

METAL

Almond Mfg. Co., Ashburnham, Mass.
TURKISH MACHINES, LATHES

Brown & Sharpe Mfg. Co., Providence.
 Canadian Machine Co., Toronto.
 Greenfield Tap & Die Corp., Greenfield.
 Grant Mfg. Co., Grand Rapids, Mich.

TURBINES, HORIZONTAL

Wheeler & Wilson, Ltd., Montreal, Que.
TURBO GENERATOR UNITS

Machinists & Co., Montreal, Que.
 Wagon & Engine, Cleveland, Ohio.
 Carter Machine Co., New York.

TURNBUCKLES

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

TURNABLES

Can. Iron Pipe Co., Toronto, Ont.
 Eden Steel & Metal, Welland, Ont.
 Morris Crane & Hoist Co., Ltd., Herbert.

TWIST DRILLS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

UPSETTING AND BENDING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

VALVE LEATHERS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

VALVE CRIMBERS, PNEUMATIC

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

VALVE HYDRAULIC

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

VENTILATING APPARATUS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

VENTILATORS

H. H. Robertson, Ltd., Sarnia, Ont.
WISE STANDS, PORTABLE

Williams & Co., J. H., Brooklyn, N.Y.
WISES, BENCH

Aikenshead Hardware Co., Toronto, Ont.
 Becker Milling Machine Co., Boston, Mass.
 Free Marley & Spiv Co., G. F., Montreal.

WISES, DRILL

Haggson & Pettis Mfg. Co., New Haven, Conn.

WISES, PIPE

Adams & Co., Ltd., Wm., Sheffield, Eng.
 Aikenshead Hardware Co., Toronto, Ont.
 Battenfield & Co., Rock Island, Que.

WISES, MILLING MACHINE

Brown & Sharpe Mfg. Co., Providence, R.I.
WISES, PLANER AND SHAPER

Aikenshead Hardware Co., Toronto, Ont.
 Skinner Chisel Co., New Britain, Conn.
 Williams & Wilson, Ltd., Montreal, Que.

WASHER MACHINES

National Machy. Co., Tiffin, Ohio
WASHERS

Adams & Co., Ltd., Wm., Sheffield, Eng.
 Battenfield & Co., Rock Island, Que.
 Graham & Knight Mfg. Co., Worcester.

WASTE CLEANER AND OIL

Reclaimers
 Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.

WATER-INTAKE SCREENS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WATER TOWERS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING, WIRE

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING, ELECTRIC, SPOT,

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING MASKS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING, GOGGLES

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING, RODS AND WIRE

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WELDING SUPPLIES

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WHEELS, CAR, STEEL

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WHEELS, SPROCKET AND

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WHEELS, TURBINE, WATER

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WHEELS, PRESSED STEEL

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WHEEL TRUING TOOLS

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

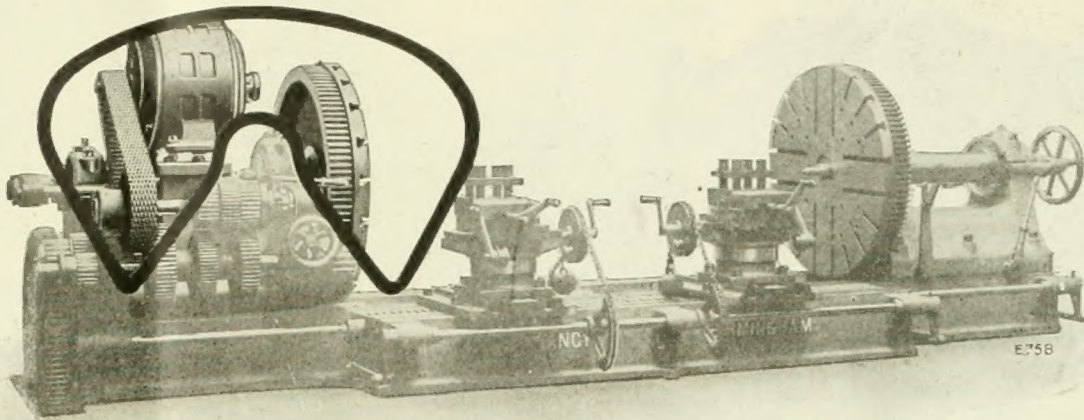
WIRE COILING AND POINTING

Canada Pipe & Steel, Ltd., Welland.
 Murray Screw & Nut Co., Ingessell, Ont.
 Rose Lewis & Son, Toronto, Ont.

WIRE COILING AND POINTING

"THE COVENTRY" CHAINS

Have you Considered the Advantages of
NOISELESS CHAIN TRANSMISSION?



"The Coventry" Noiseless Chain transmitting Power on a Tangye Lathe built for heavy work.
Note the compact arrangement of the drive.

"THE COVENTRY" CHAIN CO., LTD., COVENTRY, ENGLAND

CANADIAN AGENTS—TAYLOR & ARNOLD, LTD., BANK OF TORONTO BUILDING, MONTREAL

STEEL TUBING

FOR Agricultural Implements, Trolley Arms, Fence Posts, Bedsteads—and all kinds of manufacturing purposes. Reliable quality, uniform in size, 14 to 20 gauge, size $\frac{3}{8}$ " to 2" outside diameter.

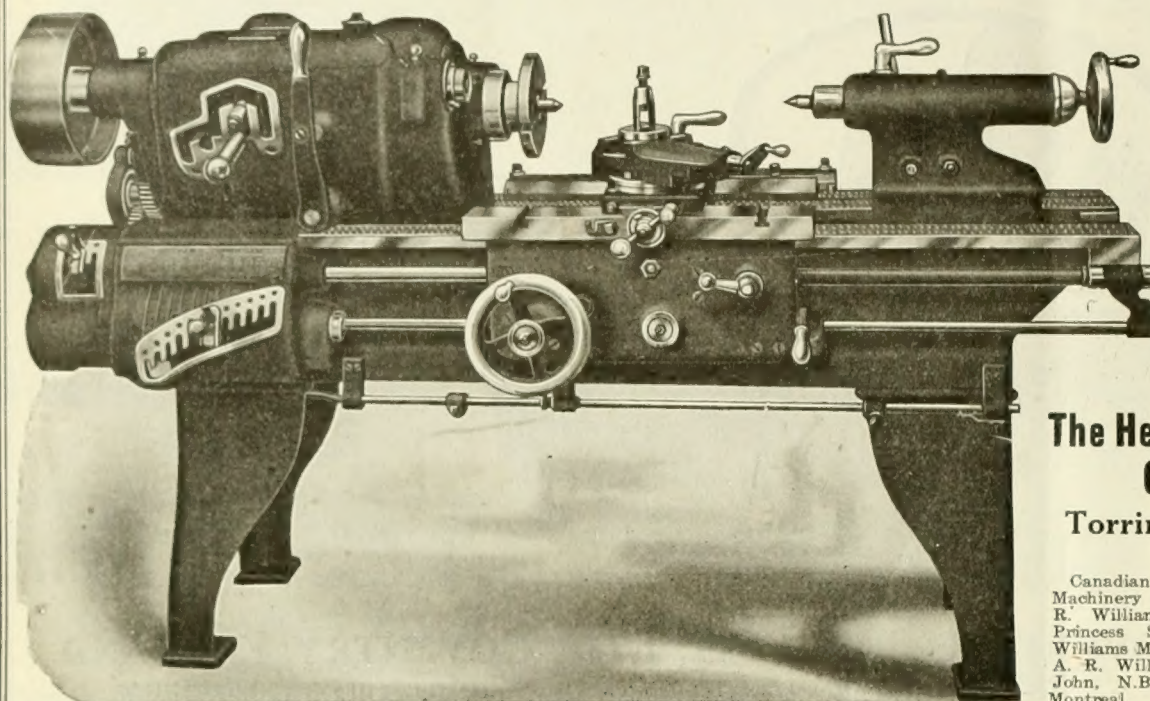
STANDARD TUBE & FENCE COMPANY, LTD.
WOODSTOCK, ONT.

INDEX TO ADVERTISERS

Shuster Co., F. B.	122	Swedish Steel & Importing Co.	18	United States Machine Tool Co.	42	Wheatley, James	148
Shore Instrument Co.	129			Universal Grinding Machine Co.	148	Whitcomb-Blandell Mach. Tool Co.	119
Silvery Tool Co.	134	T		U.S. Ordnance Dept.	95	Whitney Mfg. Co.	91
Silver Mfg. Co.	131	Taber Mfg. Co.	134			Wickes Bros.	166
Simonds Canada Saw Co.	114	Tallman Brass & Metal Co.	20	V		Wilkinson & Kompass	147
Skinner Chuck Co.	140	Technical Publications	163	Vanadium-Alloys Steel Co.	35	Williams Co., A. R.	75
Smart-Turner Mach. Co.	91	Tobedo Machine Tool Co.	104	Victoria Foundry Co.	94	Williams & Co., J. H.	142
Smith, N.	87	Taylor Instrument Co.	145	Volta Mfg. Co.	163	Willson Mfg. Co., T. A.	147
Smith, W. T.	87	Toronto Iron Works	91	Victory Mfg. Co.	163	Wilson & Co., J. C.	131
Standard Machy. & Supplies, Ltd.	98	Toronto Tooling Laboratory, Ltd.	145	Victory Loan	2, 35	Wilt Twist Drill Co.	7
Standard Optical Co.	32	Toronto Tool Co.	91			Wisconsin Electric Co.	61
Standard Tube & Fence Co.	129	Trabern Pump Co.	91	W		Wood Turret Machine Co.	148
Standard Co., L. S.	35	Turner Brass Works	122	Walcott Lathe Co.	41	Worcester Lathe Co.	178
Steel Co. of Canada	5			Walton Co., The	121	Wright Mfg. Co.	101
Steinle Turret Machine Co.	119	U		Warner & Swasey Co.	117		
St. Lawrence Welding Co.	88	Union Carbide Co.	123	Welding & Supplies Co.	95	Z	
Stoll Co., D. H.	146	Union Mfg. Co.	122	Wheel Truing Tol Co.	147	Zenith Coal & Steel Products.....	59
Swedish Orn. Steel Co.	150						

HENDEY 18-inch GEARED HEAD LATHE

8 mechanical changes of speed for spindle with driving shaft running at constant speed, 4 direct and 4 through back gears



36 DIFFERENT THREADS AND FEEDS are had through Mounted Change Gearing, each change being quickly made through controlling handles in Gear Boxes.

BEFORE PURCHASING A NEW LATHE INVESTIGATE THE HENDEY SERVICE.

WE'LL HELP YOU BY FURNISHING LIST OF USERS.

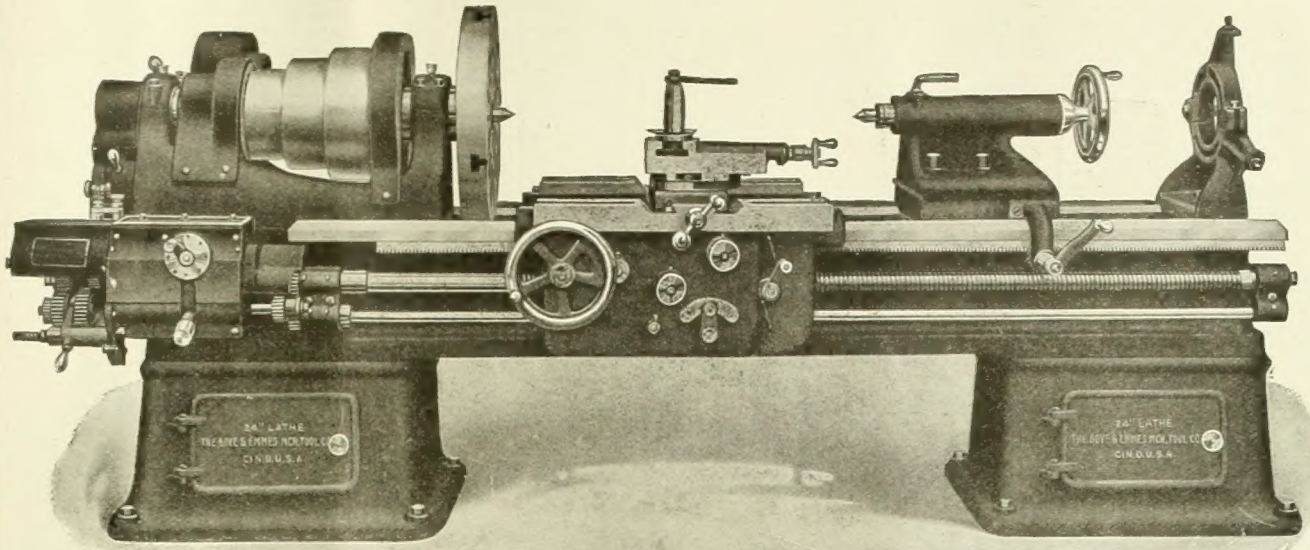
Write for descriptive circular.

The Hendey Machine Company
Torrington, Conn.

Canadian Agents: A. R. Williams Machinery Co., Toronto, Ont.; A. R. Williams Machinery Co., 260 Princess St., Winnipeg; A. R. Williams Machinery Co., Vancouver; A. R. Williams Machinery Co., St. John, N.B.; Williams & Wilson, Montreal.

INDEX TO ADVERTISERS

A		Cincinnati Electrical Tool Co.	147	Greenfield Machine Co.	28	McLaren Belting Co., J. C.	149
Acme Machine Tool Co.	8	Cincinnati Milling Machine Co.	121			Mechanical Engineering Co.	161
Aikenhead Hardware Co.	77	Cisco Machine Tool Co.	141	H		Mosta Mach. Co.	104
Algoma Steel Corp.	4	Classified Advertising	92	Hall & Sons, Ltd., John H.	14	Metalwood Mfg. Co.	149
Allentown Experimental Works.	89	Cleveland Pneumatic Tool Co.	157	Hamilton Gear Co., Ltd.	148	Milwaukee Shaper Co.	143
Almond Mfg. Co.	139	Cleveland Milling Machine Co.	98	Hanna & Co., M. A.	9	Modern Tool Co.	127
American Lead Pencil Co.	145	Cleveland Twist Drill Co.	33	Harding Bros.	106	Morrow Screw & Nut Co., J.	73
American Pipe Bending Machine Co.	174	Clipper Belt Lacer Co.	130	Hawkrider Bros.	88	Morris Crane & Hoist Co., Herbert	168
American Pulley Co.	170	Commercial Camera Co.	113	Heald Machine Co.	25	Morse Twist Drill Co.	153
Armstrong Bros. Tool Co.	44	Consolidated Optical Co.	147	Henley Machine Co.	170	Morton Mfg. Co.	88
Atlas Press Co.	89	Cook, A. S.	120	Hepburn, John T.	131	Mulcahey Mach. & Tool Co.	139
Armstrong Whitworth Co.	13	Coventry Chain Co.	169	High Speed Hammer	118		
Atkins & Co., Wm.	19	Curtis Pneumatic Mach. Co.	21	Hofer Mfg. Co.	149	N	
Audel & Co., Theo.	59	Cushman Chuck Co.	141	Hogson & Pettis Mfg. Co.	129	National Acme Co.	133
B				Homer & Wilson	91	Nicholson File	164
Baird Machine Co.	148	D		Hoyt Metal Co.	107	National Automatic Tool Co.	155
Barnes Co., Wallace	179	Darling Bros., Ltd.	146	Hunter Saw & Machine Co.	112	Nazel Eng. & Machine Works.	91
Beatty Bros.	126	Davidson Tool Mfg. Corp.	73	Hungerford Brass & Copper Co.	87	Niles-Bement-Pond, Inside front cover	
Beaudry & Co.	146	Davis-Bourmonville Co.	149	U. T.	87, 97	Northern Crane Works	128
Becker Milling Machine Co.	135	Diamond Saw & Stamping Works.	112	Hurlburt-Rogers Machinery Co.	131	Norton, A. O.	148
Belleau Industrial Furnace Co.	161	Dickow, F. C.	89			Norton Co.	42
Bernard Industrial Co., A.	150	Dominion Foundries & Steel Co.	157	I		Nova Scotia Steel & Coal Co.	18
Bertama, Ltd.	1	Drury Co., H. A.	19	Illinois Tool Works	79		
Betta Mach. Co.	89	Dunbar Bros. Co., The.	26	Independent Pneumatic Tool Co.	153	O	
Bicknell-Thomas Co.	139			Ingersoll File Co.	40	Onkey, John	104
Bilton Mach. Tool	125	E		International Malleable Iron Wks.	34	Onkey Chemical Co.	5
Bliss Co., E. W.	27	Eastern Machine Screw Corp.	141	International Mach. & Supply Co.	91	Oliver Machinery Co.	167
Bloom Co., J. G.	28	Electric Steel & Metals Co.	18				
Brantford Oven & Rack Co.	89	Elliott & Whitehall	16, 17	J		P	
Bristol Company	146	Escher, Wyss Co.	147	Jardine & Co., A. R.	13	Page Steel & Wire Co.	162
Bristol Machine Tool Co.	116			Johnson Machine Co., Canby.	8	Pangborn Corporation	143
Brown, Jesse Co.	11	F		Joliet Steel Co.	147	Parmenter & Bulloch Co.	148
Brown Engineering Corp.	94	Fellows Gear Shaper Co.	132	Jones & Glasco	28	Peerless Machine Co.	118
Bryant Chucking Grinder Co.	146	Petherstonhaugh & Co.	87	Joyce-Kosbel Co.	149	Perfect Mach. Co.	36, 37
Budden, Hanbury A.	87	Firth & Sons, Thos.	9			Perrin, Wm. H.	121
Butterfield & Co., Inc.	124	Fitchburg Grinding Mach. Co.	148	K		Philadelphia Gear Works	150
C		Ford Chain Block & Mfg. Co.	129	Katie Foundry Co.	100	Pilot Steel & Tool Co.	20
Canada Foundries & Forgings, Ltd.	13	Ford-Smith Machine Co.	10	Kayser, Ellison & Co.	12	Pink Co., Thomas.	114
Canada Machinery Corporation.		Foss Mach. & Supply Co., Geo. F.	10	Kearney & Trecker Co.	108	Powers, Ltd.	89
		Forrest, Jackson & Forrest	148	Kelly Reamer Co.	83	Positive Clutch & Pulley Works	147
Canada Metal Co.		Ford Chain Block & Mfg. Co.	129	Kennedy & Sons, Wm.	140	Pratt & Whitney, Inside front cover	
Canadian Cartridge Co.	20	Ford-Smith Machine Co.	10			Puro Sanitary Drinking Fountain Co.	88
Can. Blower & Forge Co.	176	Frost Mfg. Co.	146	L		Q	
Can. Consolidated Rubber Co.	106	Foster Machine Co.	137	Landis Machine Co.	21	Quickwork Co.	130
Can. Desmond-Stephan Co.	47	Franklin Mfg. Co.	142	Landis Tool Co.	165		
Can. Driver-Harris Co., Ltd.	94			Lathrop Electric Steel Co.	24	R	
Can. Fairbanks-Morse Co.	46	G		Lindley, John	89	Rae Mach. Tool Works	86
Can. General Electric	175	Garlock-Walker Machy. Co.	85	Long & Allsatter	138	Racine Tool & Machine Co.	114
Can. Graton & Knight Co.	43	Gervin Machine Co.	165	Luffkin Rule Co.	89	Rickert-Shafer Co.	123
Can. Ingersoll-Rand Co.	4	Geometric Tool Co.	75	Lynd-Farquhar Co.	118	Riddell & Co.	149
Can. Link Belt Co.	29	Gilbert & Barker Mfg. Co.	159			Ridout & Maybee	87
Can. Machinery & Mfg. News.	2, 35	Gisholt Machine Co.	44, 45	M		Rockford Drilling Mach. Co.	100
Can. SKF Co., Ltd.	22, 73	Goodyear Tire & Rubber Co.	30, 31	Manitoba Steel Foundries, Ltd.	146	Rockwell Co., W. S.	149
Can. Steel Foundries Ltd.	9	Grooley & Ellum, Inc.	136	Manhattan Mach. Tool Co.	129	Roelofson Machine & Tool Co.	16
Can. Winkley Co.	147	Grant Gear Works	148	Marshalltown Mfg. Co.	120		
Carborundum Co.	96, 97	Grant Mfg. & Machine Co.	26	Marshall, Son & Bunney	19	S	
Carver Welding Co.	125	Graton & Knight Mfg. Co.	73	Mathews & Co., James H.	42	St. Catharines, City of	38
Carville Johnson Machine Co.	8	Greb Company	88	McDougall Co., Ltd., R.	40	Seneca Falls Mfg. Co.	118



This is a Photograph of a

BOYE & EMMES

**24-Inch Instantaneous Change Gear
Engine Lathe**

Double Back Geared

Double Plate Apron

Acknowledged by all users to be the best
Lathe of its type on the market today. Made
in sizes ranging from 18 in. to 48 in.

Why not specify a Boye & Emmes Lathe on
your next order and be convinced.

Carried in stock by

The Geo. F. Foss Machinery and Supply Co., Limited

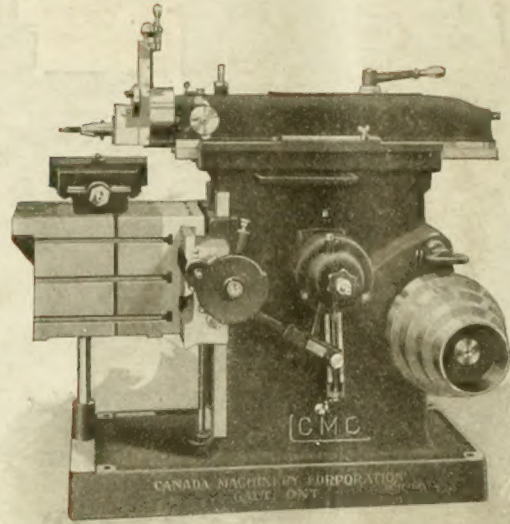
305 ST. JAMES ST., MONTREAL

CANADIAN DISTRIBUTORS

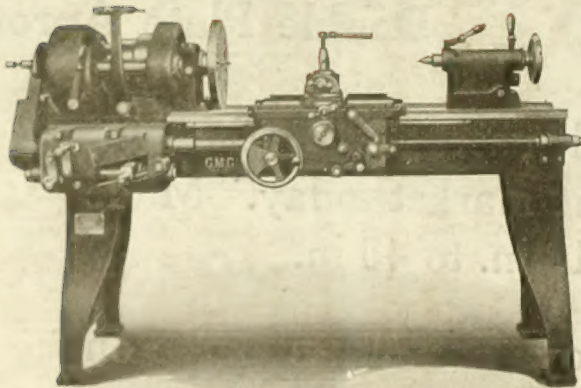


MACHINES FOR THE TOOL ROOM

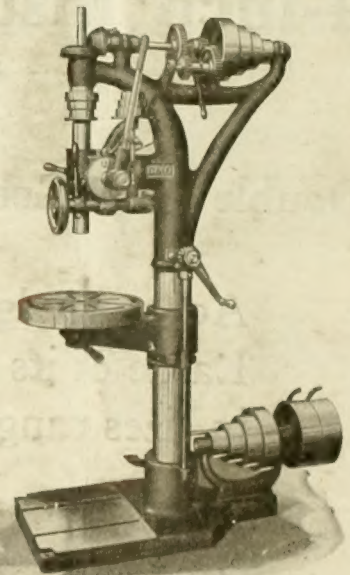
Tool room machines must of all things be accurate and in this respect we confidently assert that C.M.C. tools are unexcelled.



20 in. x 22 in. Crank Shaper



14 in. Tool Room Lathe



20 in. Power Feed Drill

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

Toronto Office and Warerooms

Brock Avenue Subway